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TECHNICAL REPORT
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FIELD EVALUATION OF THE INDIVIDUAL SOLDIER ENHANCED RATION AND THE HEAT AND SERVE RATION

By
Kathryn Rock
Shivaun Roach
Judy Aylward
Susan Harrington
F. Matthew Kramer
L.L. Lesher



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NATICK RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
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13. ABSTRACT (Maximum 200 words) The primary objective of the Individual Soldier Enhanced Ration (ISER) project is to provide additional menus for the MRE, to increase variety, and promote greater food consumption by reducing menu fatigue. The Heat and Serve Ration (formerly known as the Tray Ration) was designed to provide good quality, nutritionally complete meals to mobile troops in the field and combat situations. The unitized 18-soldier meal modules of the Heat and Serve Ration contain all items necessary for a complete meal, including the entree, vegetable, starch, dessert, beverages, snack items, and utensils. A 7 day field evaluation of the acceptability of both developmental and nondevelopmental food items for the ISER and Heat and Serve Ration was conducted 15-21 September 1994 at the Yakima Training Center, Yakima, WA. The evaluation found most food items of the MRE and Heat and Serve Ration acceptable for field feeding. Soldiers agree that more menus are needed in the MRE and would like to see the new food items that were evaluated included in the ration. Most new food items evaluated for the Heat and Serve Ration also received favorable ratings and soldiers recommended an increase in the variety of food items available in the ration							
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TABLE OF CONTENTS

	PAGE
List of Tables	v
Preface	vii
Introduction	1
Methodology	1
Test Subjects	1
Training	1
Ration Distribution	2
Data Collection	2
Section 1 - ISER	
Demographics	3
Results	3
Acceptability/Portion Size	3
Entrees	4
Crackers/Rice	4
Fruit	4
Bars	5
Snack/Candy	5
Condiments	5
Drinks	6
Heating	6
Consumption	7
Pogey Bait	9
Variety	10
ISER Discussion	11
ISER Conclusion/Recommendations	11
Section II - Heat And Serve	
Demographics	12
Results	13
Acceptability	13
Breakfast	13
Dinner	13
Heating	15
Portion Size	17
Variety	18
Heat and Serve Discussion	19
Heat and Serve Conclusion/Recommendations	19
References	20
Appendices	21
A. Questionnaires	23
B. Menus	41
C. Portion Sizes	45
D. Suggested Food Items	49
E. Overall Comments	53
F. Mean Acceptability Ratings of Freeze Dried Eggs	59
G. Focus Group Report	61

LIST OF TABLES

Section 1 -

ISER

TABLE		PAGE
1	Rank (%)	3
2	Ethnic Background (%)	3
3	Entree Acceptability Ratings	4
4	Cracker/Rice Acceptability Ratings	4
5	Fruit Acceptability Ratings	5
6	Bar Acceptability Ratings	5
7	Snack/Candy Acceptability Ratings	5
8	Condiment Acceptability Ratings	6
9	Drink Acceptability Ratings	6
10	Entree with Perceived Mean Overall Temperature, Percent Heated and Reasons for not Heating	7
11	Participants Reasons for not eating the ISER Entree (% of Total Population)	8
12	"Other" Reasons for not eating or completely consuming the ISER Entree	8
13	Other Food Items Not Eaten (N)	9
14	Pogey Bait Taken To The Field	9
15	Variety Rating by Food Group	10
16	Percent Response to "How many menus would you like to see in the Ration?"	10
17	Recommendations for Increasing Variety	10

Section II -

Heat And Serve

18	Rank %	12
19	Ethnic Background %	12
20	Acceptability of Breakfast Heat And Serve Food Items	14
21	Acceptability of Dinner Heat And Serve Food Items	15
22	Food Temperature and Satisfaction	16
23	Amount of Food Received in Meal by Day	17
24	Mean Portion Size Ratings Of Food Consumed	17
25	Variety Ratings by Food Group	18
G-1	Items Preferred for the MRE Entrees	62
G-2	Items Preferred for the MRE Snacks	63
G-3	Items Preferred for the MRE Candy/Sweets	63
G-4	Items Preferred for the MRE Condiments	63
G-5	FRH Suggestions	64
G-6	Items Preferred for the Tray Ration Breakfast	65
G-7	Items Preferred for the Tray Ration Dinner	65

PREFACE

The final report of the Individual Soldier Enhanced Ration (ISER) and the Heat and Serve Ration was prepared by the U.S. Army Soldier Systems Command (PROV), Natick Research, Development and Engineering Center (NRDEC). Data collection took place during 15-21 September at Yakima Training Center, Yakima, WA with soldiers from the 542nd Maintenance Battalion from Ft. Lewis, WA. Ms. Kathryn Rock was the project officer for the evaluation and is affiliated with the Consumer Research Branch, Behavioral Sciences Division, Science and Technology Directorate. The report was prepared under project No. 644713CP110R00.

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INTRODUCTION

The Meal, Ready to Eat (MRE) remains an integral member of the U.S. Army family of operational rations. However, to meet the soldiers' changing needs the MRE requires continual improvement that will enhance acceptability and improve nutritional intake to maintain peak performance on the battlefield. Through the Individual Soldier Enhanced Ration (ISER) program 12 new menus will be introduced into the MRE, 4 menus in Feb. 1995, 4 in Feb. 1996 and 4 in Feb. 1997, making the total number of menus 24. The primary objective of the ISER program is to provide additional menus for the MRE, to increase variety, and reduce menu fatigue. Previous research has shown that menu fatigue can lead to a decrease in food acceptability and, in some instances, reduced intake. Reduced intake can impair soldier performance by not providing the appropriate nutritional requirements for an active adult in the battlefield (1,2,3,4,5). Both the Army Logistics Research and Development Plan for 1991 and the United States Army Modernization Plan address field feeding, operational deficiencies, and the provision of nutritious meals and food services for various combat and contingency situations. Providing the soldier the best possible ration enhances the soldier's quality of life. To effectively sustain the soldier, high quality, highly acceptable, nutritious rations must be provided to maintain/enhance performance on the battlefield (6,7).

The Heat and Serve Ration (formerly known as the Tray Ration) was designed to provide good quality, nutritionally complete meals to mobile troops in the field and combat situations. Heat and Serve Rations are fully prepared group meals comprised of thermostabilized foods packed in sealed, half-size steam table containers. The containers serve as a package, a heating pan, and a serving tray. The unitized 18-soldier meal modules of the Heat and Serve Ration contain all items necessary for a complete meal, including the entree, vegetable, starch, dessert, beverage, snack items, and utensils (8,9).

A field evaluation examining the acceptability of developmental and nondevelopmental food items for both the ISER and Heat and Serve Ration was conducted 15-21 September 1994 at the Yakima Training Center, Yakima, WA. This report details the findings of that evaluation.

METHODOLOGY

TEST SUBJECTS

A total of one hundred and seventy-nine soldiers of the 542nd Maintenance Battalion from Ft. Lewis participated in this evaluation. During the evaluation, the battalion was engaged in a planned field exercise at the Yakima Training Center in Yakima, WA. Not all participants were included in data analysis because of incomplete data. See the MRE and Heat and Serve Ration demographic sections for the total number used in the analysis.

TRAINING

Yakima Training Center is located approximately 200 miles southeast of Seattle, WA. The terrain is of desert type with dry sandy soil and no trees. The average temperature was approximately 40 degrees at night and rose to an average of 80 degrees during the day. There was no precipitation during this evaluation.

Soldiers trained at a single location throughout the seven-day field exercise. During the day their training consisted of missions to repair vehicles, gun and radio maintenance, guard duty, Kitchen Police (KP), and inspection of roads for travel. Soldiers also attended training classes on various subjects. During the evening hours, soldiers formed a defensive perimeter and were subject to simulated ambushes and probing attacks.

RATION AND RATION DISTRIBUTION

The ration cycle throughout the field exercise was Heat and Serve breakfast and dinner with an ISER for lunch. Breakfast was served daily between 0730 and 0900 and dinner was served nightly between 1630 and 1900.

The ISER, similar to the MRE, contains an entree/starch, crackers, a spread (cheese, peanut butter or jelly), a dessert, snack, beverages, an accessory packet, plastic spoon and a Flameless Ration Heater (FRH). The flexibly packaged foods are heat processed in retortable pouches. The Tray ration components are thermally-processed prepared, shelf stable foods packaged in hermetically sealed half-sized steam table metal containers. This ration provides food items for breakfast and lunch/dinner menus, along with instant beverages, non-dairy creamer, hot sauce, cups, utensils, and 5 compartment tray for eating.

The ISER was distributed to the soldiers from the Mobile Kitchen Trailer (MKT) at the breakfast meal. ISER menus used during this evaluation can be found in Appendix B. Heat and Serve food items were heated using immersion heaters and served in the MKT. Heated food items were served from long serving trays placed over M2 burners. Along with the meal modules, bread, milk, and fresh fruit (apples and oranges) were served at every meal, with an addition of cereal at the breakfast meal and salad at the dinner meal. Drinks were made in large batches and placed outside the MKT on a table with cups and condiments, in a self-serve area. Shelf Stable Milk in 8 oz cartons was served from an ice-filled cooler next to the condiment/drinks table. Appendix B contains the breakfast and dinner Heat and Serve menus used for the field evaluation. Carrots, tomatoes, cucumbers, and oranges were used to garnish the entrees, starches and cakes. Hot meals were eaten in a large general purpose tent with enough tables and benches to accommodate approximately 70 soldiers.

DATA COLLECTION

Prior to the field evaluation, soldiers were briefed on the purpose of the field evaluation and testing procedures. At the conclusion of the briefing, soldiers completed a short questionnaire providing demographic information and baseline ration opinions. See Appendix A for the questionnaires used in this evaluation.

Acceptability ratings for ISER food items were collected daily at the morning meal (10). Soldiers received the ISER acceptability form at the breakfast meal, completed it over a 24-hour period, and returned it to the data collector at the following breakfast meal. Data collectors reviewed each form when collected to ensure completeness and accuracy.

Heat and Serve food item acceptability ratings were collected at the breakfast and dinner meals. Forms for the Heat and Serve meals were distributed prior to the meal being evaluated and collected after the meal. On the last day of data collection the test participants completed a final questionnaire which gathered information on the new ISER and Heat and Serve food items evaluated.

SECTION I - ISER

DEMOGRAPHICS

One hundred and sixty-three soldiers, male (145) and female (18), were included in the ISER phase of the analysis. The average age of the participants was 26.2 years with an average length of time in the service of 83.4 months (approximately 7 years). Tables 1 and 2 below show the rank and ethnic background of the participants.

Table 1
Rank (%)

ENLISTED		WARRANT OFFICER	
E-1 ---	4%	E-5 ---	14%
E-2 ---	11%	E-6 ---	9%
E-3 ---	13%	E-7 ---	3%
E-4 ---	40%	E-8 ---	1%

OFFICER
O-1 to O-3--- 3%

Table 2
Ethnic Background (%)

White	56%	Asian/Pacific Islands	5%
Black	26%	American Indian/Alaskan Native	2%
Hispanic	7%	Other	4%

RESULTS

ACCEPTABILITY/PORTION SIZE

Acceptability of the ISER food items was rated daily using the following 9-point hedonic scale:

DISLIKE EXTREMELY MUCH	DISLIKE VERY	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
1	2	3	4	5	6	7	8	9

Acceptability ratings reported in Table 3 are the mean ratings from the daily acceptability forms. The number of responses (N) is the number of subjects who rated a particular food item. If a subject rated an item more than once, his ratings were averaged before the mean acceptability rating was calculated. This approach yields mean responses with equal weight given to each participant. Portion sizes were rated using the following 7-point hedonic scale. Portion size was rated only on the final questionnaire.

MUCH TOO LITTLE 1	MODERATELY TOO LITTLE 2	SOMEWHAT TOO LITTLE 3	JUST RIGHT 4	SOMEWHAT TOO MUCH 5	MODERATELY TOO MUCH 6	MUCH TOO MUCH 7
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ENTREES: Eight new entrees were tested during this field evaluation. The soldiers liked all the new entrees, as indicated by acceptability ratings above the midpoint of the scale. Macaroni and Cheese was the least acceptable of the new eight entrees but still had a mean rating of 5.67. Beef Ravioli (6.93) and Jamaican Pork Chops (6.82) received the highest ratings. Table 3 shows the mean acceptability ratings of all the new entrees. The portion sizes of all the entrees fell slightly below "Just Right", with Turkey Ham Slices having the lowest rating of 3.57, while the portion size of Macaroni and Cheese was rated the highest with 3.87. See Appendix B for a complete listing of mean portion size ratings for ISER food items tested.

Table 3
Entree Acceptability Ratings

<u>Entree</u>	<u>Mean</u>	<u>N</u>
Beef Ravioli	6.93	67
Jamaican Pork Chops	6.82	74
Turkey Ham Slices	6.75	66
Turkey Breast w/Potatoes	6.74	65
Chicken Stew	6.66	66
Homestyle Chicken	6.63	59
Turkey Tetrazzini	6.59	69
Macaroni & Cheese	5.67	69

CRACKERS/RICE: Though the standard MRE cracker (5.76) was rated lower than the Peanut Butter and Cheese Cracker (6.57), both cracker ratings still fell in the "like" range with scores above a 5 ("Neither Like Nor Dislike"). Soldiers would like to see a variety of crackers in the ration. The addition of the Peanut Butter and Cheese Cracker that was evaluated would help increase the variety of the crackers. See acceptability rating of the crackers, along with the Mexican Rice in Table 4.

Table 4
Cracker/Rice Acceptability Ratings

<u>Cracker/Rice</u>	<u>Mean</u>	<u>N</u>
Peanut Butter and Cheese Cracker	6.57	62
MRE Cracker	5.76	140
Mexican Rice	5.75	61

FRUIT: Three fruit items were evaluated and all 3 received acceptability ratings of "Like Moderately" or above (Table 5). The soldiers felt the portion sizes were acceptable, with ratings of around "Just Right". The number of responses for the mixed fruit are very low because of the availability of this item. This item is not packed in the ration at the same frequency as the pineapples. Soldiers liked both wet pack (WP) and dehydrated fruits (FD) available in the MRE. Wet pack fruits are good for meals when the soldier is not very active, and the dehydrated fruit is a convenient food item when on the move.

Table 5
Fruit Acceptability Ratings

<u>Fruit</u>	<u>Mean</u>	<u>N</u>
Pineapples (WP)	7.41	77
Applesauce (WP)	7.08	67
Mixed Fruit (FD)	7.00	14

BARS: Of the bars that were evaluated, the Fig Bar (7.61) received the highest rating. The Shortbread was the only ISER food item evaluated that received an acceptability rating below "Neither Like Nor Dislike". Table 6 represents the mean ratings of the bars evaluated.

Table 6
Bar Acceptability Ratings

<u>Bar</u>	<u>Mean</u>	<u>N</u>
Fig Bar	7.61	59
Peanut Munch Bar	7.29	63
Shortbread Bar	4.62	80

SNACK/CANDY: Numerous snack/candy items were evaluated and all received ratings above 6, "Like Slightly". Below in Table 7, is a list of the snack/candy items evaluated and their respective mean ratings.

Table 7
Snack/Candy Acceptability Ratings

<u>Snack/Candy</u>	<u>Mean</u>	<u>N</u>
Jolly Rancher Candy	7.65	61
Lemon Pound Cake	7.59	64
Beef Jerky	7.56	108
Skittles Candy	7.42	60
Granola Bites	7.38	62
Corn Chips	7.32	99
Orange Pound Cake	7.30	47
Fudge Brownies	6.29	110
Raisin Nut Mix	6.16	60

CONDIMENTS: Tabasco Sauce (7.77) remains a favorite of the soldiers when in the field. Soldiers also liked the new Jalapeno Cheese Spread (7.40), but their comments indicate that they would like it packaged with the Ravioli so the two could be mixed together. The Peanut Butter & Jelly Combo Pack (7.02) was also liked by the soldiers. Some soldiers hold the standard MRE peanut butter until they receive a jelly packet or vice-versa in order to use them together. Both freeze dried and wet pack salsas (6.69, 6.50 respectively) were also liked, and soldiers would like these incorporated into the ration and served with the new corn chips. See Table 8 for a complete list of condiments and their mean acceptability ratings.

Table 8
Condiments Acceptability Ratings

<u>Condiments</u>	<u>Mean</u>	<u>N</u>
Tabasco Sauce	7.77	63
Jalapeno Cheese Spread	7.40	84
Combo Pack, PB&J	7.02	120
Salsa, freeze dried	6.69	38
Salsa, wet pack	6.50	29

DRINKS: Table 9 shows the acceptability rating of the beverages available. The sugar-free drinks came 5 different flavors, and the Beverage Base Drinks were available in only 4 of these 5 flavors. Soldiers reported that they liked having a variety of beverage flavors available while in the field.

Table 9
Drinks Acceptability Ratings

<u>Drinks</u>	<u>Mean</u>	<u>N</u>
Lemon Tea	7.62	48
Cocoa	7.31	24
Sugar Free Drinks	7.15	26
Beverage Base Drinks	6.89	32
Coffee	6.79	19

HEATING

The FRH was the heating mechanism most widely used by the soldier to heat the ISER entrees during this evaluation. Most entrees were heated before they were consumed. "Not enough time" was the major reason given by soldiers for not heating their food. Below in Table 10 is a list of entrees, percent of soldiers that heated them, and the reasons for not heating. Also included in the table is the perceived temperature of the entree, which was rated using the following 7-point hedonic scale:

EXTREMELY COLD	MODERATELY COLD	SOMEWHAT COLD	NEITHER HOT NOR COLD	SOMEWHAT HOT	MODERATELY HOT	EXTREMELY HOT
1	2	3	4	5	6	7

All entrees were rated between "Neither Hot nor Cold" and "Somewhat Hot"(4 & 5) except Jamaican Pork Chops, which was rated just above "Somewhat Hot". The number of soldiers that did not heat the entree is small, consequently the number for the responses for "Reason for not Heating" are also small. These reason are stated to give the reader a clearer understanding why the entrees are not heated. No one reason for each individual food was stated more than 10 times.

A small number of ISER food items other than entrees were heated during this evaluation, the most common of these being Mexican Rice. The other items heated include the Jalapeno Cheese Spread, brownie, cookie, and applesauce.

Table 10
Entrees with Perceived Mean Overall Temperature, Percent Heated, and Reasons for not Heating

<u>ENTREE</u>	<u>TEMP</u>	<u>% HEATED</u>	<u>REASONS FOR NOT HEATING</u>
Jamaican Pork Chop	5.07	84%	did not want to no time no heater
Macaroni & Cheese	4.96	84%	no time better cold saving heater
Chicken Stew	4.93	81%	did not want to no time like it cold
Homestyle Chicken	4.83	76%	no time already warm to hungry to wait like it cold
Turkey Ham Slices	4.80	72%	no time did not want to in vehicle like it cold saved heater
Beef Ravioli	4.71	75%	no time did not want to in vehicle heater did not work like it cold
Turkey Tetrazzini	4.65	68%	no time did not want to like it cold
Turkey Breast	4.64	75%	no time in vehicle didn't take the time like it cold

CONSUMPTION

The majority of soldiers (61%) completely consumed the ISER entrees. Some soldiers (7%) reported not eating the entree, mostly due to not being hungry. Table 11 below represent the total population that responded to an entree, the percent of the total population that did not eat the entree categorized by reason for not eating. Table 12 explains "Other" (from Table 11) reasons for not eating. The remaining soldiers (32%) showed evidence of not completely consuming the entree. "Not hungry" was reported by the majority of these soldiers as to why the entree was not completely consumed. Table 13 shows non entree foods that were reported as 'not consumed' by the soldiers during this evaluation. Along with the food item is the number (N) of time the item was mentioned and the reasons reported for not eating.

Table 11
Participant's reason for not eating the ISER entree (% of total population)

<u>ENTREE</u>	TOTAL POPULATION	<u>DID NOT EAT</u>			<u>OTHER</u> %
		<u>NOT HUNGRY</u> N	<u>%</u>	<u>DID NOT LIKE</u> %	
Jamaican Pork Chop	80		1.3	---	1.3
Homestyle Chicken	74		1.4	2.7	4.1
Beef Ravioli	91		3.3	1.1	---
Chicken Stew	86		5.8	1.2	2.3
Turkey Breast	78		5.1	2.6	---
Macaroni & Cheese	80		3.8	---	1.3
Turkey Ham Slices	92		4.3	1.1	4.3
Turkey Tetrazzini	80		1.3	1.3	---

Table 12
“Other” reasons for not eating or completely consuming the ISER entree

Jamaican Pork Chop

- too much salt
- not enough time
- in vehicle
- meat dry, too much gravy, not enough noodles

Beef Ravioli

- full
- saved for later
- did not feel like it
- ravioli too pasty

Turkey Breast

- not good cold
- patty tasted funny

Turkey Ham Slices

- no time
- traded for Jalapeno Cheese

Homestyle Chicken

- no time
- saved for later

Chicken Stew

- do not eat food with preservatives
- full
- no time
- too hot to eat

Macaroni & Cheese

- no flavor
- saved for later
- did not like cold

Turkey Tetrazzini

- too sweet
- saving for snack

Table 13
Other Food Items Not Consumed (N) and Reasons For Not Consuming

MRE CRACKER: (28) dislike, too dry, saved for later, falls apart, too hard, not hungry for
RICE: (6) too spicy, didn't feel like it, didn't heat
APPLESAUCE: (1) (no stated reason)
PINEAPPLE: (5) seemed old, don't like
MIXED FRUIT: (1) no water
OATMEAL BAR: (1) too dry
SHORTBREAD: (10) don't like, dry/no taste, too chalky
FUDGE BROWNIE: (5) don't eat sweets, not hungry, don't like
FIG BAR: (1) (no stated reason)
CHIPS: (2) did not want
CAKE: (1) too full
SALSA: (6) No time, did not like, too much hassle, did not want
TABASCO SAUCE: (4) did not need, no time
PEANUT BUTTER & JELLY: (21) traded for cheese, saved for snack, too much fat, falls off cracker, not hungry, gave away
JALAPENO CHEESE SPREAD: (4) did not like
JOLLY RANCHER: (2) did not like
SKITTLES: (1) too sugary
BEVERAGE: (16) no water, drank only water, saved for later, weather too hot, too much trouble, no flavor, don't like, wasn't thirsty
LEMON TEA: (4) don't like lemon, don't like tea, don't drink
COFFEE: no water, don't drink, did not want, saved for morning, weather too hot
COCOA: (10) no water, weather too hot, saved for morning, don't drink, don't like

POGEY BAIT

Pogey Bait is a term referring to non-ration food items soldiers typically take to the field with them. The amount taken to the field depends on the availability of room in their rucksack or vehicle. This type of unit, mechanics, had the ability to carry a large amount of pogey bait with them because they have sufficient vehicle space. Below in Table 14 is a list of the most common pogey bait items taken to the field by the test participants.

Table 14
Pogey Bait taken to the Field

Beef Jerky
Beverages: apple juice, fruit drink, iced tea
Bread: donut, muffin, white
Candy: Almond M&Ms, Butterfingers, gum, Jolly Ranchers, Snickers
Canned Fruit
Cheese
Chips: Doritos, potato, Pringles, tortilla
Cookies: Fig Newtons, Oreos, Chocolate Chip
Crackers: cheese, Ritz
Meat: bacon, beef, lunch, potted, Spreadables, Tuna, Vienna Sausages
Noodles: Ramen
Nuts: peanuts, sunflower seeds
Snack: Cheetos, Combos, Granola Bars, Pop Tarts, Pretzel
Soda: Dr. Pepper, Coke, Pepsi
Soup: Cup o' Soup, Lipton Soup Mix

VARIETY

Prior to the study soldiers rated the variety of foods within several different food groups of the MREs they have consumed in the past. A 7-point hedonic scale was used to rate the food groups:

EXTREMELY TOO LITTLE VARIETY	MODERATELY TOO LITTLE VARIETY	SLIGHTLY TOO LITTLE VARIETY	JUST RIGHT	SLIGHTLY TOO MUCH VARIETY	MODERATELY TOO MUCH VARIETY	EXTREMELY TOO MUCH VARIETY
1	2	3	4	5	6	7

Responses of the participants indicate that the variety of the MRE is slightly too little for all food groups. Entree, fruit, and drinks received lowest ratings (2.9), while candy received the highest variety rating of 3.1. Table 15 represents mean variety by food group. Most soldiers would like to see 16 or more menus in the MRE, as shown by the data in Table 16. Other than increasing the number of menus to increase variety, soldiers indicated several ways variety may be increased. These are stated in Table 17 below.

Table 15
Variety Rating by Food Group

<u>FOOD GROUP</u>	<u>MEAN</u>
Entrees	2.9
Starches	3.0
Desserts	3.0
Fruits	2.9
Drinks	2.9
Candy	3.1
Overall ISER	3.0

Table 16
Percent Response to "How many Menus would you like to see in the Ration?"

<u>Number of Menus</u>	<u>PERCENT</u>
Less than 12	4
12-15	26
16-20	29
21-24	12
25 or More	29

Table 17
Recommendations For Increasing Variety

- Add more items from each food group, including vegetables
- Bigger portions of entrees
- Have less entrees with spaghetti sauce
- Have less stew-type items
- Add more flavors of drinks
- Add more food to overall ISER

ISER DISCUSSION

The majority of food items evaluated were well received. Further development of the shortbread is recommended. All other food items, based solely on the acceptability ratings received from this evaluation, can be considered for inclusion in the MRE. Once the menus are complete, further field evaluation should be conducted to determine if the soldier can subsist solely on the MRE.

Soldiers surveyed would like to see more menus included in the MRE. With the food groups being equally rated on variety, it may suggest increasing not only the number of entrees available but other items as well. Soldiers indicated that not only does the number of menus available in the MRE increase variety, but also the amount of variation within each food type (entrees, snacks, beverages, etc.). Pogey bait items listed in Table 14 and items listed in Appendix D can be used as a reference as to which foods soldiers like to consume while in field conditions.

The ISER entrees were usually consumed by these test participants. The main reason for not eating the entree was the lack of time due to mission. It may be necessary to investigate entree items that are able to be eaten on the move, in order to continue to provide a nutritionally balanced meal.

ISER CONCLUSIONS/RECOMMENDATIONS

- 1) All entrees received favorable ratings and should be considered for inclusion as MRE entrees.
- 2) The Shortbread Bar received a mean acceptability rating less than 5 (4.62), and a new formulation may be necessary. It is recommended not to include this food item in the MRE at this time.
- 3) Consider a variety of wet pack fruits such as pineapples, pears, peaches, and applesauce, in the MRE.
- 4) Have a variety of crackers available in the MRE. Include the Peanut Butter and Cheese cracker, along with the standard MRE cracker.
- 5) All snack/candy items received favorable ratings and can be considered for the MRE.
- 6) Continue to increase variety and number of menus in the MRE.

SECTION II - Heat And Serve Ration

DEMOGRAPHICS

These participants differ slightly from the participants included in the ISER analysis. Soldiers selected for inclusion in the Heat and Serve phase participated in the pre-briefing and consumed at least two Heat and Serve meals. During the pre-briefing it was stated that these soldiers were not familiar with the Heat and Serve Ration. They reported eating only MRE and A-Rations during past field exercises. Cooks present in the field verified that both A- and T-Rations are commonly served to these troops, but Heat and Serve eggs are typically replaced with fresh eggs at the morning meals. Also, because of the fashion these meals are typically served by these cooks, with garnishes in long metal serving trays, the soldiers did not recognize the food as Heat and Serve food.

One hundred and sixty-five soldiers, male (146) and female (19), were used for the analysis of the Heat and Serve food items. They averaged 26.2 years old and had been in the Army for an average of 84 months (approximately 7 years). Table 18 below shows the ranks of the participants and Table 19 represents their Ethnic Background. All participants graduated from high school, while 55% went on to college and 10% had earned a college degree.

TABLE 18
Rank %

<u>ENLISTED</u>		<u>WARRANT OFFICER</u>
E-1 --- 4%	E-5 --- 14%	WO-1 TO WO-4 --- 2%
E-2 --- 11%	E-6 --- 9%	
E-3 --- 13%	E-7 --- 3%	
E-4 --- 39%	E-8 --- 1%	<u>OFFICERS</u>
		O1 to O3 --- 4%

TABLE 19
Ethnic Background %

White	55%
Black	27%
Hispanic	7%
Asian/ Pacific Islands	4%
American Indian/ Alaskan Native	2%
Other/Missing	5%

RESULTS

ACCEPTABILITY

The acceptability of ration items was rated using the following 9-point hedonic scale:

DISLIKE EXTREMELY	DISLIKE VERY	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY	LIKE EXTREMELY
MUCH							MUCH	

1

2

3

4

5

6

7

8

9

Acceptability data were collected daily at both hot meals. Forms were distributed prior to the soldier entering the MKT for his/her hot meal and collected once the soldier finished eating. Tables 20 and 21 show the mean acceptability rating and number of soldiers rating each item at breakfast and dinner meals, respectively. Breakfast was served on days 2 through 7 between 0730 - 0900 am; dinner was served on day 1 through day 6 between 1630 - 1900 pm. For comparative purposes, prior to the study, participants rated the overall Heat and Serve Ration based on past experience. This rating averaged 4.95 or just below "Neither Like Nor Dislike" on the 9-point hedonic scale. This rating may reflect only their opinions of the ration and not actual acceptability. These soldiers were often unaware they were eating Tray Ration when in the field because of the manner in which the food is served.

BREAKFAST

The eggs were rehydrated approximately 30 minutes prior to the start of the meal. The observed method of rehydration by the cooks was not as stated on the package. Directions on the package recommend preparation in the package adding 22-24 ounces of hot water. These cooks put together several packages of eggs in a large bowl and added an unmeasured amount of water. Once rehydrated, a portion of the eggs was transferred to a long serving tray and more eggs were added when needed. The oatmeal was not served in the individual packets, but was made as one large batch and served in the MKT along with the other food items. The ranchero sauce was rehydrated and served from a container separate from the eggs, for soldiers to take as desired. Cakes were sliced and made available to the soldiers at the end of the serving line, along with fresh bread and fresh fruit.

The scrambled eggs w/bacon were rated the highest (4.19) of the egg items evaluated, while the plain scrambled eggs were rated the lowest (2.92). All other breakfast food items evaluated were rated above the mid-point of the scale, 5 "Neither Like nor Dislike". The eggs were also tasted by the test evaluators, who found several batches not properly rehydrated. In some cases the center of the eggs had a crunchy texture.

When asked to list foods to add or not to include in the Heat and Serve Ration, the dehydrated eggs were mentioned by 69 soldiers (42%), an unusually high response rate for an open ended question. Roast beef hash (N=3), pork sausage links (3), creamed ground beef (1), and ham slices (1) were also mentioned as foods not to include. Several items were requested for inclusion in the ration: pork sausage links (10), roast beef hash (6), creamed beef (3), ham slices (3), eggs w/bacon (3), all eggs (2), eggs w/bacon and cheese (1), oatmeal (1) and ranchero sauce (1).

DINNER

Dinner was served in a manner similar to breakfast, from the MKT and surrounding area. The Jalapeno cheese spread was served in the MKT and not with the condiments, to prevent hoarding.

All foods items, except macaroni twist (4.69), received ratings above "Neither Like Nor Dislike". Of the entrees the chicken breast w/gravy (5.61) received the lowest acceptability rating, while the meatballs w/gravy was the highest-rated food item with a mean rating of 6.84. Refer to Table 4 for a complete list of dinner foods and the mean acceptability ratings. Several soldiers reported that the chicken breast was dry although it was served with gravy.

Macaroni twist (N=10) was the most common food item chosen not to be included in the ration. Other food items mentioned were frankfurters (5), green beans (4), tamale pie (4), chicken breast (3), carrots (2), baked beans (2), all cakes (2), beef strips (1), beef chunks (1), coffee cake (1), mexican rice (1), and sour cream tea cake (1). Among the food items mentioned to include in the ration are tamale pie (20), chicken breast (15), frankfurters (15), beef chunks (12), red beans and rice (10), baked beans (6), French style green beans (4), meatball w/gravy (4), beef strips (3), white rice (2), fruit (2), jalapeno cheese spread (2), macaroni twist (2), and mexican rice (1).

Table 20
Acceptability of Breakfast Heat and Serve Food Items

<u>Food Item</u>	<u>Mean</u>	<u>N</u>
Scrambled Eggs w/Bacon (FD)	4.19	88
Western Scrambled Eggs (FD)	3.68	115
Scrambled Eggs with Cheese (FD)	3.34	101
Plain Scrambled Eggs (FD)	2.92	136
Creamed Ground Beef	5.31	103
Roast Beef Hash	5.08	118
Pork Sausage Links	6.51	159
Ham Slices	6.14	137
Oatmeal, Cinnamon & Brown Sugar	6.76	87
Oatmeal, Apple Cinnamon	6.52	122
Oatmeal, Plain	6.13	96
Oatmeal, Strawberry	5.89	98
Ranchero Sauce	6.12	85
Coffee Cake w/Crumb Topping	6.30	90
Spice Cake w/Topping	5.62	129
Sour Cream Tea Cake	5.48	98
Pears	7.59	97
Fruit Cocktail	7.54	125
Peaches	7.53	126
White Bread	6.53	152
Wheat Bread	6.49	85
Cocoa	6.97	93
Orange Juice	6.93	138
Chocolate Milk	6.90	78
Grape Juice	6.69	68
White Milk	6.36	81
Coffee	6.13	57

Table 21
Acceptability of Dinner Heat and Serve Food Items

<u>Food Item</u>	<u>Mean</u>	<u>N</u>
Meatballs w/Gravy	6.84	116
Beef Chunks w/Noodles	6.40	126
Beef Frankfurters	6.37	119
Tamale Pie	6.32	118
Beef Strips	6.27	96
Chicken Breast w/Gravy	5.61	117
Baked Beans & with Bacon Sauce	6.67	110
White Rice	6.54	150
Macaroni Twist	4.69	108
Red Beans & Rice	5.70	98
Corn	6.85	113
Green Beans	6.49	83
French Style Green Beans	6.14	87
Carrots	5.88	120
Yellow Cake w/Topping	6.00	82
Fudge Cake w/Topping	5.83	109
Sour Cream Tea Cake	5.59	74
Wheat Bread	6.13	62
Loaf Bread	6.09	90
White Bread	5.97	140
Pears	7.70	82
Fruit Cocktail	7.40	10
Applesauce	7.03	109
Jalapeno Cheese Spread	8.21	14
Cheese Spread	6.97	29
Peanut Butter	6.61	12
Jelly	6.26	11
Beverage, Orange	7.22	106
Chocolate Milk	7.12	75
Beverage, Fruit Punch	7.10	117
White Milk	6.82	48
Coffee	6.09	14
Beverage, Lemon-Lime	6.00	3

HEATING

The temperature of the entrees, meat side dishes and hot drinks was rated using the following 7-point scale:

COLD	MODERATELY COLD	COLD	SOMEWHAT COLD	NOR COLD	HOT	SOMEWHAT HOT	MODERATELY HOT	EXTREMELY HOT
1	2	3	4	5	6	7		

The satisfaction with entree temperatures was assessed using the following 7-point hedonic scale:

MUCH TOO COLD	MODERATELY TOO COLD	SOMEWHAT TOO COLD	JUST RIGHT	SOMEWHAT TOO HOT	MODERATELY TOO HOT	MUCH TO HOT
1	2	3	4	5	6	7

The temperature of the entrees only all fell slightly above the midpoint of the scale, while the satisfaction of the temperature of all items fell slightly below "Just Right". Satisfaction with the temperature of the dinner entrees was slightly higher than satisfaction with the temperature of the breakfast entrees. See Table 22 for the mean temperatures of the hot food items and the mean temperature satisfaction of only the entrees.

Table 22
Food Temperature and Satisfaction

	<u>Food Item</u>	<u>Mean Temperature</u>	<u>Mean Satisfaction</u>
ENTREES			
	Roast Beef Hash	4.53	3.68
	Plain Scrambled Eggs	4.49	3.64
	Western Scrambled Eggs	4.47	3.50
	Scrambled Eggs w/Cheese	4.31	3.58
	Scrambled Eggs w/Bacon	4.17	3.45
	Beef Strips	5.09	3.84
	Beef Chunks w/Noodles	4.82	3.93
	Tamale Pie	4.60	3.81
	Chicken Breast w/Gravy	4.55	3.78
	Beef Frankfurters	4.38	3.66
	Meatballs w/Gravy	4.37	3.72
MEAT SIDE DISHES			
	Pork Sausage Links	4.53	
	Creamed Ground Beef	4.45	
	Ham Slices	4.39	
VEGETABLES & SIDE DISHES			
	Carrots	4.94	
	White Rice	4.87	
	Corn	4.61	
	French Style Beans	4.58	
	Macaroni Twist	4.50	
	Baked Beans w/Bacon sauce	4.37	
	Red Beans and Rice	4.27	
	Green Beans	4.25	
HOT BEVERAGES			
	Cocoa	5.73	
	Coffee	5.42	

PORTION SIZES

At each meal soldiers were asked to rate the amount of food received in the overall meal. This was rated using the scale:

MUCH TOO LITTLE	MODERATELY TOO LITTLE	SOMEWHAT TOO LITTLE	JUST RIGHT	SOMEWHAT TOO MUCH	MODERATELY TOO MUCH	MUCH TO MUCH
1	2	3	4	5	6	7

The portion size ratings of the meals are listed in Table 23 by day; see Appendix B for the daily meal menus. Also evaluated, on the final questionnaire, was the portion size of the individual food items consumed during the evaluation. In Table 24 are the ratings of the individual items. In general the soldiers reported the portion sizes to be "Just Right", though the eggs were rated slightly higher.

Table 23
Amount of Food Received in Meal By Day

<u>DAY</u>	<u>BREAKFAST</u>	<u>DINNER</u>
1	-----	3.58
2	3.34	3.71
3	3.53	3.85
4	3.74	3.94
5	3.62	3.76
6	3.96	3.75
7	3.78	-----

Table 24
Mean Portion Size Ratings Of Food Consumed

<u>Food Item</u>	<u>Mean</u>	<u>Food Item</u>	<u>Mean</u>
Plain Scrambled Eggs	4.30	Spice Cake w/Topping	3.82
Scrambled Eggs w/Bacon	4.27	Coffee Cake w/Crumb Topping	3.81
Western Scrambled Eggs	4.19	Sour Cream Tea Cake	3.79
Roast Beef Hash	3.67	Fudge Cake w/Topping	3.78
Tamale Pie	3.73	Yellow Cake w/Topping	3.74
Chicken Breast w/Gravy	3.70	Peanut Butter	3.97
Beef Strips	3.69	Jelly	3.93
Beef Chunks w/Noodles	3.61	Ranchero Sauce	3.81
Beef Frankfurters	3.57	Cheese Spread	3.75
Creamed Ground Beef	3.70	Jalapeno Cheese Spread	3.48
Pork Sausage Links	3.74		
Ham Slices	3.61		

Table 24 (cont.)
Mean Portion Size Ratings Of Food Consumed

<u>Food Item</u>	<u>Mean</u>	<u>Food Item</u>	<u>Mean</u>
Macaroni Twist	3.95	White Bread	3.85
Red Beans & Rice	3.78	Loaf Bread	3.80
White Rice	3.71	Wheat Bread	3.75
French Style Green Beans	3.70	Cocoa	3.86
Baked Beans w/Rice	3.68	Orange Juice	3.83
Carrots	3.66	Coffee	3.83
Green Beans	3.65	Grape Juice	3.76
Corn	3.53	Beverage Base Drinks	3.75
Pears	3.54	Fruit Cocktail	3.55
Peaches	3.49		
Applesauce	3.44		

VARIETY

Prior to the start of the evaluation, soldiers were asked to rate the variety of foods in certain food groups available in the Heat and Serve Ration. Variety was rated on a 7-point scale:

EXTREMELY TOO LITTLE VARIETY	MODERATELY TOO LITTLE VARIETY	SLIGHTLY TOO LITTLE VARIETY	JUST RIGHT	SLIGHTLY TOO MUCH VARIETY	MODERATELY TOO MUCH VARIETY	EXTREMELY TOO MUCH VARIETY
1	2	3	4	5	6	7

All food group ratings fell below the mid point of the scale, 4 = "Just Right". These scores may reflect the ration these soldiers are accustomed to consuming in field conditions: A-Rations rather than Heat and Serve Rations. Some of the suggestions for increasing variety are to add more food items for each food group. For the entree, suggestions of fish and vegetarian dishes were mentioned. Serving more than one entree at a meal was also mentioned.

Table 25
Variety Ratings by Food Group

Food Group	Mean
Entree	3.15
Starch	3.34
Desserts	3.24
Fruits	3.17
Vegetables	3.22
Drinks	3.28
Candy	3.16
Overall	3.26

HEAT AND SERVE DISCUSSION

As seen in the current results, the typical items in the Heat and Serve Ration were evaluated favorably by the soldiers. Given that this particular group was accustomed to receiving A-Rations while training and that soldiers could, and many did, bring their own food items, the results support a conclusion that the Heat and Serve Ration is a generally acceptable product for field feeding.

HEAT AND SERVE RATION CONCLUSIONS/RECOMMENDATIONS

- 1) All dinner food items received acceptable ratings and can be considered for inclusion in the Heat and Serve Ration.
- 2) Breakfast food items which were well liked by the participants can be considered for inclusion in the Heat and Serve Ration. Freeze Dried eggs have received more favorable rating in past evaluations under similar field conditions, see Appendix F. The results from this field evaluation may have been influenced by improper rehydrating techniques and inappropriate serving temperatures. The rehydrating procedures used for freeze dried eggs may need to be closely monitored and the eggs taste tested before they are served to ensure proper rehydration and texture. The data also indicates that soldiers were not satisfied with the temperature of the eggs; inappropriate food temperatures can affect acceptability. With proper rehydration and serving temperature, soldiers' acceptability of the eggs may increase.
- 3) During this evaluation the oatmeal was prepared in one large batch, not served in individual packets. Serving the oatmeal this way was less work for the soldier. He did not need to carry two additional loose items, a cup of water and oatmeal packet, along with his tray of food, utensils, and beverages. Also the soldiers indicated that the oatmeal tasted better made from the batches than from the individual packets. It is recommended that other options for serving hot oatmeal be explored.
- 4) It is recommended that further investigation, including consumption, of the Heat and Serve Ration be conducted once the menus are finalized and nutritionally balanced.

This document reports research undertaken at the U.S. Army Soldier Systems Command, Natick Research, Development and Engineering Center and has been assigned No. NATICK/TR-*93/031* in the series of reports approved for publication.

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APPENDICES

APPENDIX A
QUESTIONNAIRES

BACKGROUND QUESTIONNAIRE

Please read each question carefully. Mark your answers by filling in the circle(s) next to the correct answer.



1. Your Initials: _____

2. ID: _____

3. Your rank:

	1	2	3	4	5	6	7	8	9
E	<input type="radio"/>								
O	<input type="radio"/>								
W	<input type="radio"/>								

4. What is your gender?

Male
 Female

5. What is your age? _____ years

6. How long have you been in the armed services?

7. Have you been deployed to any of the following?

Please fill in the bubble(s) for your deployments.

Saudi Arabia
 Somalia
 Grenada
 Panama
 Other _____

Vietnam
 Macedonia
 Sinai
 Bosnia

_____ Years _____ Months

8. What is the highest level of education you have completed ?

Finished grade school
 Some high school
 High school graduate or grad equivalent
 Some college
 College graduate

9. What is your ethnic background?

White
 Black
 Hispanic
 Asian/Pacific Islander
 American Indian/ Alaskan Native
 Other (please specify) _____

10. In what part of the country have you lived the longest? (fill in appropriate circle)

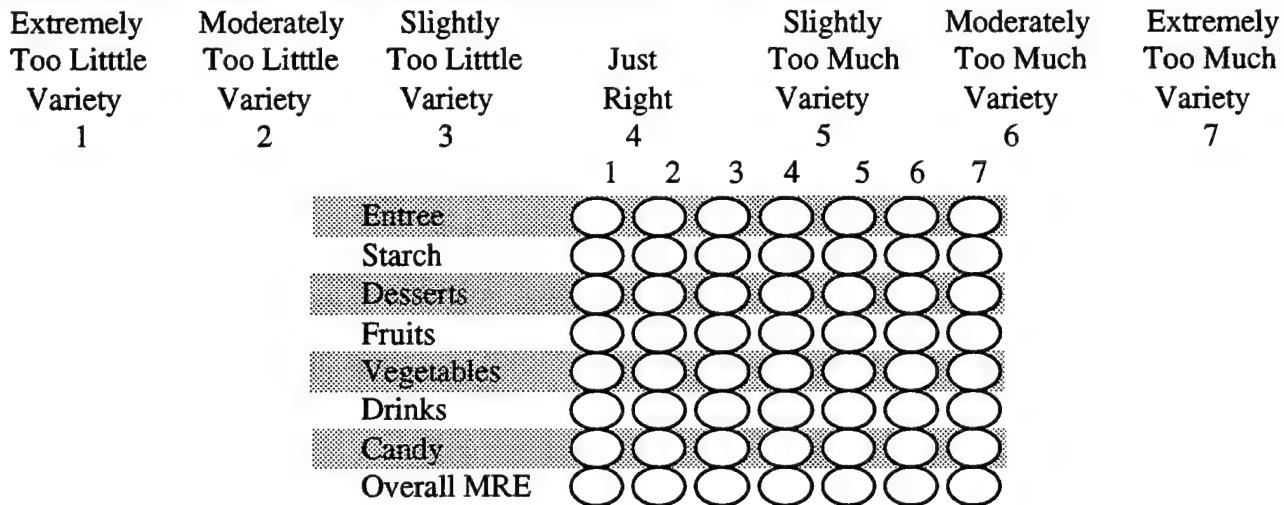
New England (ME, NH, VT, MA, CT, RI)
 Middle Atlantic (NJ, NY, PA)
 South Atlantic (DE, MD, VA, WV, NC, SC, GA, FL, DC)
 North Central (OH, IN, IL, MI, WI, MN, IA, MO, ND, SD, NE, KS)
 South Central (KY, TN, AL, MS, AR, LA, OK, TX)
 Mountain (ID, WY, CO, MT, AZ, NM, UT, NV)
 Pacific (WA, OR, CA, AK, HI)
 Other (please specify) _____

DO NOT WRITE BELOW THIS LINE

Q5	Q6 years	Q6months	ID																																								
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Please answer the following questions on the MRE you typically eat during field exercises.

11. Please rate the variety of the food groups listed below for the MRE.



IF TOO LITTLE (ratings of 1, 2, or 3) please explain how to increase variety

12. How many different menus would you like to see in the MRE? Please choose one

- Less than 12
- 12-15
- 16-20
- 21-24
- 25 or more

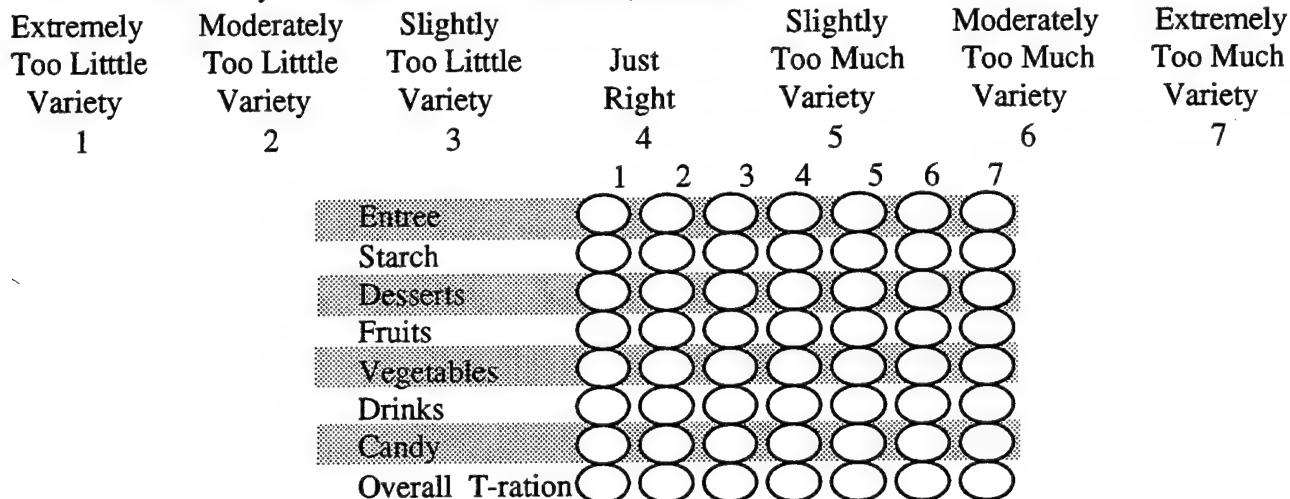
13. What food items would you like dropped from the MRE? Please list below.

14. Please list food items you would like to see included in the MRE in the following categories. Please be realistic.

Entrees
Crackers
Spreads
Seasonings
Snacks
Candy
Beverages
Other

Please answer the following questions on the Tray Ration you typically eat during field exercises.

15. Please rate the variety of the food items in the Tray Ration.



IF TOO LITTLE (ratings of 1, 2, or 3) please explain how to increase the variety:

16. How many different menus would you like to see in the Tray Ration? Please choose one.

- Less than 12
- 12-15
- 16-20
- 21-24
- 25 or more

17. What food items would you like dropped from the Tray Ration? Please list below.

18. Please list food items you would like to see included in the Tray Ration in the following catagories.
Please be realistic.

Entrees
Vegetables
Crackers
Spreads
Seasonings
Snacks
Candy
Beverages
Other

19. Would you like to see different menus for different meals in the MRE and the Tray Ration?

	YES	NO
Tray Ration	8	8
MRE	8	8

IF YES, please list types of entrees that you would like to see in the MRE and Tray Ration for each meal listed below.

MRE

TRAY RATION

Breakfast		
Lunch		
Dinner		

20. During a typical field exercise, what types of rations do you usually eat for the meals indicated below?

	A RATION	MRE	T RATION
Breakfast	8	8	8
Lunch	8	8	8
Dinner	8	8	8

21. Typically during active conflict or a goodwill mission, what type of rations do you eat for the meals indicated below?

	A RATION	MRE	T RATION
Breakfast	8	8	8
Lunch	8	8	8
Dinner	8	8	8

22. How do you typically heat your MRE entree?

- Do Not Heat
- Squad Stoves
- Field Kitchen

- Flameless Ration Heater
- Streno
- Other _____

- Heat Tabs
- Optimus Stove

23. Please rate the the overall MRE.

DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NIETHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
8	8	8	8	8	8	8	8	8

24. Please rate the the overall Tray Ration.

DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NIETHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
8	8	8	8	8	8	8	8	8

Daily Breakfast Tray Ration Form

Name _____

ID _____

Please rate how hungry you were before eating your Tray ration meal and after you finished eating your meal.

	Not at All Hungry	Slightly Hungry	Moderately Hungry	Very Hungry	Extremely Hungry
Before Meal	<input type="radio"/>				
After Meal	<input type="radio"/>				

Please use the scale below to rate the acceptability of the food you ate at this Tray Ration meal.

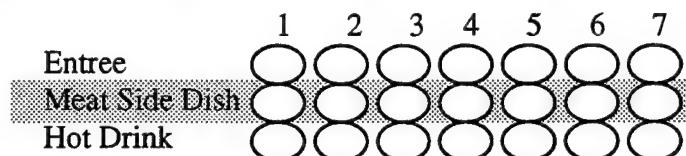
DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NEITHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
1	2	3	4	5	6	7	8	9
Did Not Eat								
Scrambled Eggs with Bacon & Cheese (FD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Plain Scrambled Eggs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Western Scrambled Eggs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corned Beef Hash	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Roast Beef Hash	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creamed Ground Beef	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pork Sausage Links	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ham Slices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Oatmeal flavor _____	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ranchero Sauce	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coffee Cake with Crumb Topping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spice Cake with Topping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sour Cream Tea Cake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peaches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fruit Cocktail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pears	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
White Bread	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wheat Bread	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
White Milk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chocolate Milk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Orange Juice, instant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grape Juice, instant	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coffee	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cocoa	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the amount of food you received in this meal.

Using the scale below, please rate the overall temperature of the following foods.

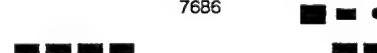
Extremely Cold **Moderately Cold** **Somewhat Cold** **Neither Hot nor Cold** **Somewhat Hot** **Moderately Hot** **Extremely Hot**

1 2 3 4 5 6 7



Was your ENTREE too cold, too hot, or just right for you?

ID	DO NOT WRITE IN THIS BOX									
0	1	2	3	4	5	6	7	8	9	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
DAY							OATMEAL			
1	2	3	4	5	6	7	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

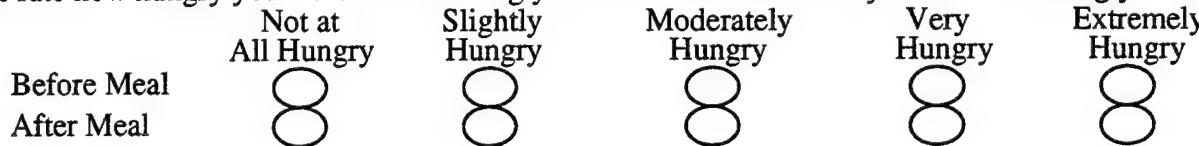


MRE Daily Form

Name _____

ID _____

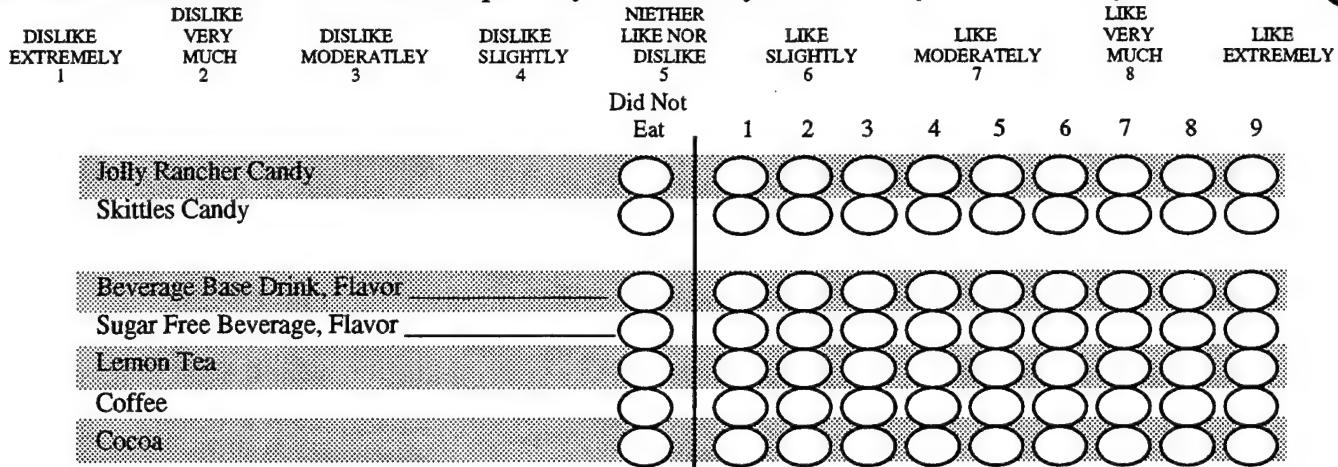
Please rate how hungry you were before eating your MRE meal and after you finished eating your meal.



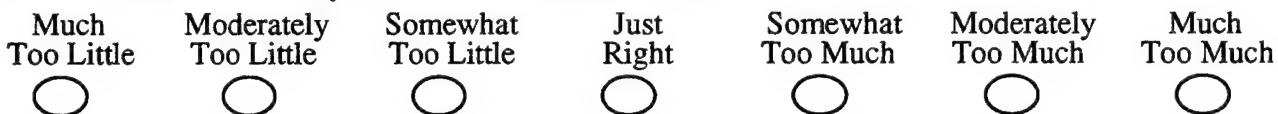
Please use the scale below to rate the acceptability of the food you ate from your MRE today.

DISLIKE EXTREMELY 1	DISLIKE VERY MUCH 2	DISLIKE MODERATELY 3	DISLIKE SLIGHTLY 4	NIETHER LIKE NOR DISLIKE 5	LIKE SLIGHTLY 6	LIKE MODERATELY 7	LIKE VERY MUCH 8	LIKE EXTREMELY 9
Did Not Eat								
1 2 3 4 5 6 7 8 9								
Jamaican Pork Chop with Noodles	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Homestyle Chicken with Noodles & Veggies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beef Ravioli	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chicken Stew	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turkey Breast with Potatoes & Gravy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Macaroni & Cheese	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turkey Ham Slices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Turkey Tetrazzini	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
MRE Cracker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peanut Butter and Cheese Cracker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mexican Rice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Applesauce	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pineapple	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mixed Fruit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Oatmeal Fruit Bar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shortbread Bar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peanut Munch Bar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Raisin Nut Mix	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Granola Bites	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fudge Brownie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fig Bar	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Beef Jerky	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corn Chips	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lemon Pound Cake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Orange Pound Cake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Salsa (wet pack freeze dried)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tabasco Sauce	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peanut Butter & Jelly Combo Pack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jalepeno Cheese Spread	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
1 2 3 4 5 6 7 8 9								

Please use the scale below to rate the acceptability of the food you ate from your MRE today.



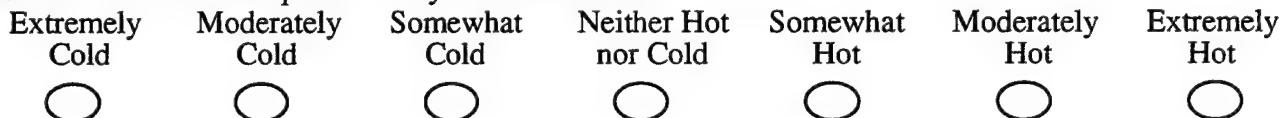
Please rate the amount of food you received in the MRE meal.



Did you heat your MRE entree? YES NO

IF NO, Please explain why you did not heat your entree:

Please rate the overall temperature of your MRE entree.



Did you heat any food items other than your MRE entree? YES NO

IF YES, what did you heat?

If you did not eat or completely finish your entree please explain why

NOT HUNGRY DID NOT LIKE

OTHER, please explain _____

ID	DO NOT WRITE IN THIS BOX																							
0 1 2 3 4 5 6 7 8 9	DAY							SALSA WF			BEV			SUGAR FREE BEV										
	1	2	3	4	5	6	7		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	<input type="checkbox"/>																							

Daily Dinner Tray Ration Form

Name _____

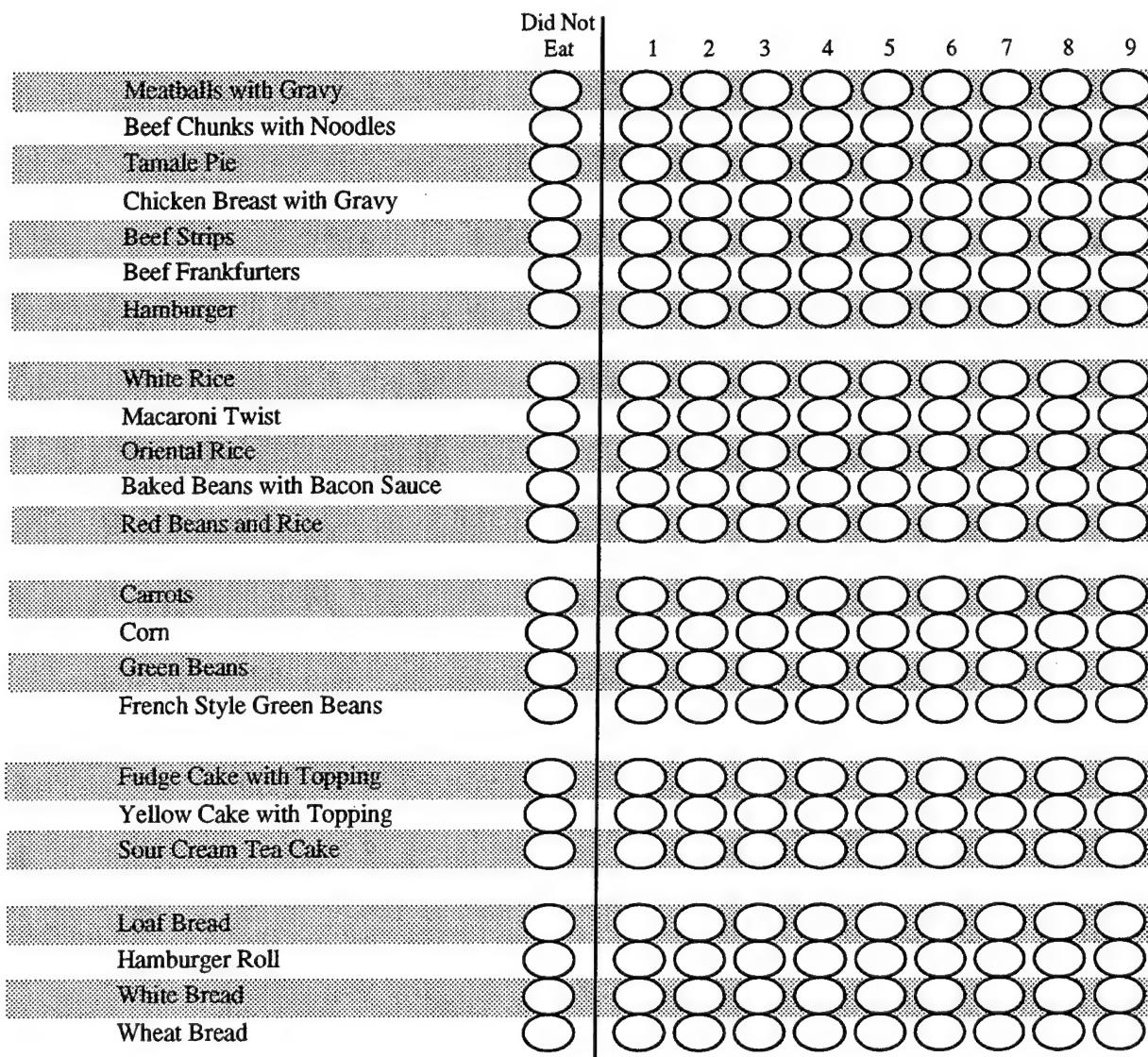
ID _____

Please rate how hungry you were before eating your Tray ration meal and after you finished eating your meal.

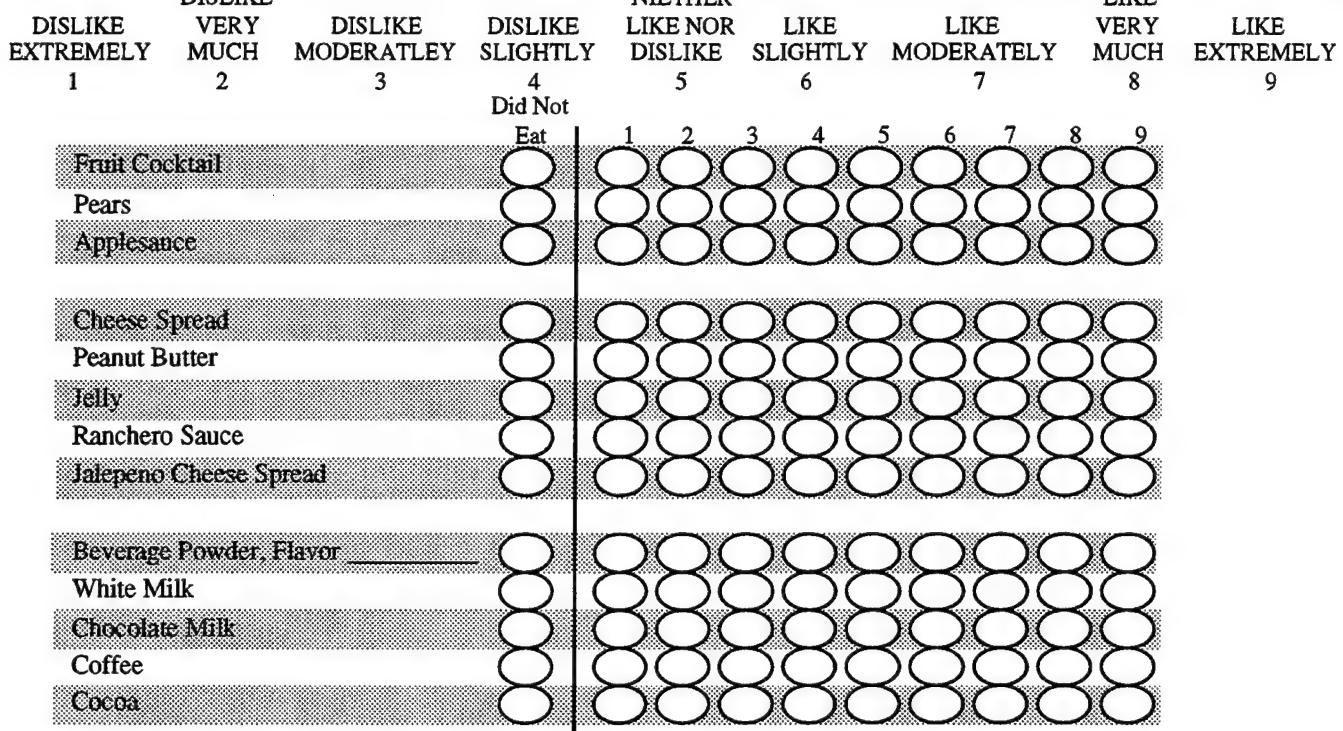
	Not at All Hungry	Slightly Hungry	Moderately Hungry	Very Hungry	Extremely Hungry
Before Meal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
After Meal	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please use the scale below to rate the acceptability of the food you ate at this Tray Ration meal.

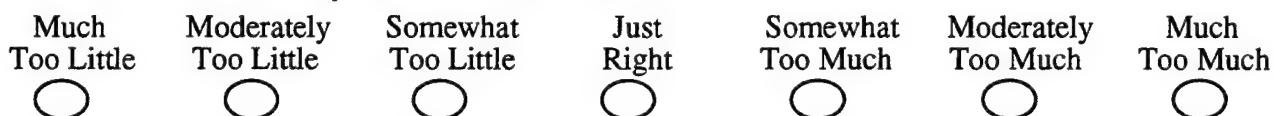
DISLIKE EXTREMELY	DISLIKE VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NIETHER LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY
1	2	3	4	5	6	7	8	9



CONT: Please use the scale below to rate the acceptability of the food you ate at this Tray Ration meal.



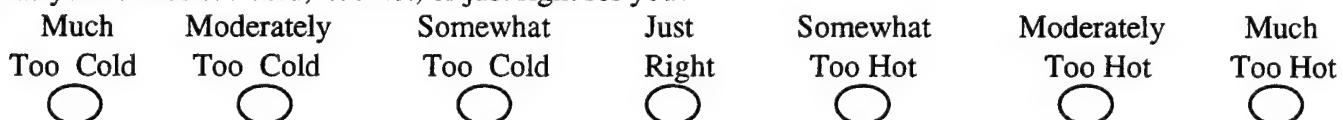
Please rate the amount of food you received in this meal.



Please rate the overall temperature of your food.



Was your entree too cold, too hot, or just right for you?



What was your activity level today?



ID	DO NOT WRITE IN THIS BOX															
0 1 2 3 4 5 6 7 8 9	BAY							BEV								
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FINAL QUESTIONNAIRE

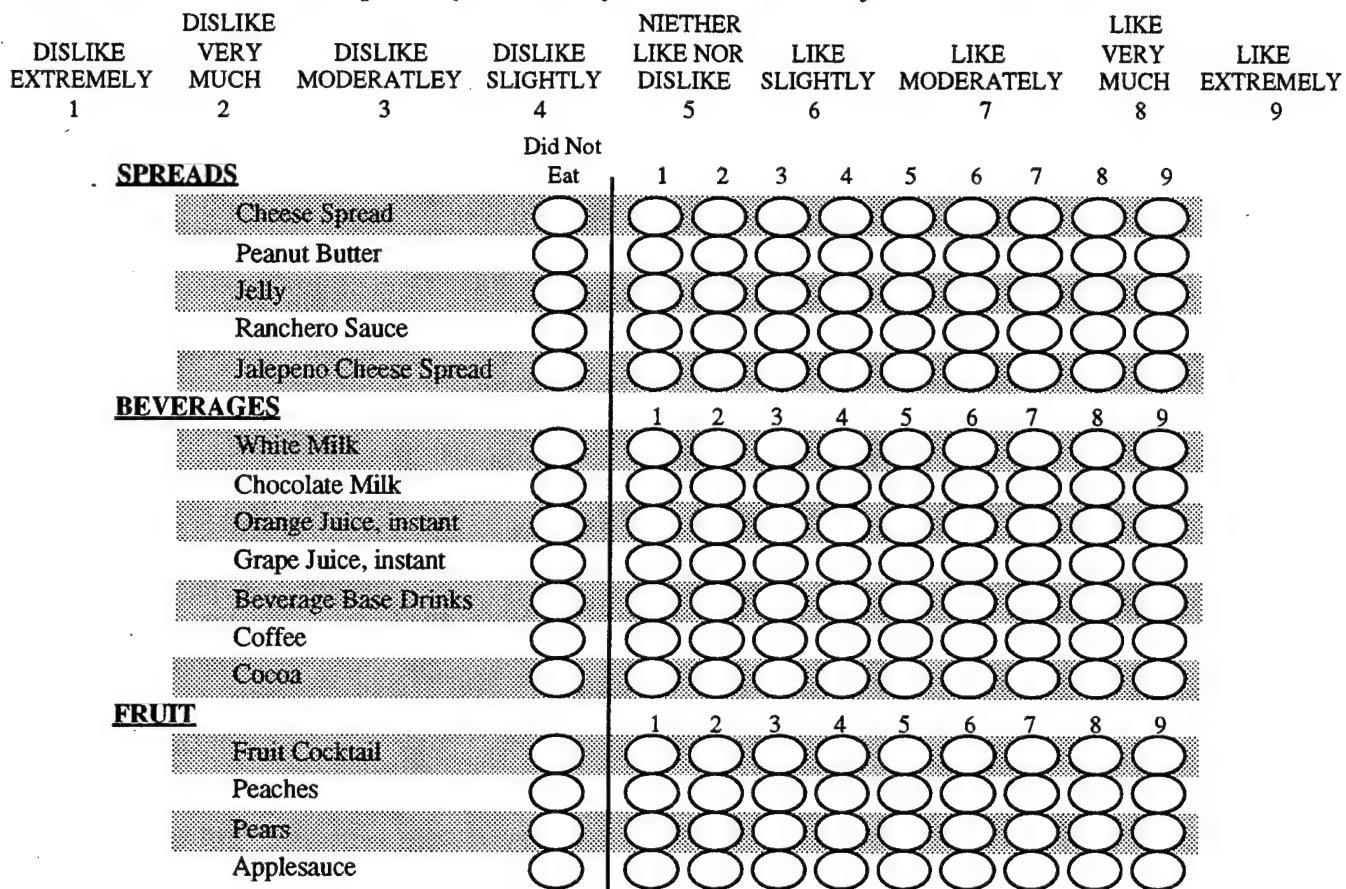
Your Initials: _____

ID: _____

1. Please rate the acceptability of the Tray Ration food items you ate this week.

	DISLIKE EXTREMELY	VERY MUCH	DISLIKE MODERATELY	DISLIKE SLIGHTLY	NIETHER DISLIKE	LIKE NOR DISLIKE	LIKE SLIGHTLY	LIKE MODERATELY	LIKE VERY MUCH	LIKE EXTREMELY	
	1	2	3	4	5	6	7	8	9		
ENTREES	Did Not Eat										1 2 3 4 5 6 7 8 9
Scrambled Eggs with Bacon & Cheese (FD)	<input type="radio"/>										
Plain Scrambled Eggs	<input type="radio"/>										
Western Scrambled Eggs	<input type="radio"/>										
Corned Beef Hash	<input type="radio"/>										
Roast Beef Hash	<input type="radio"/>										
Chicken Chow Mein	<input type="radio"/>										
Beef Chunks with Noodles	<input type="radio"/>										
Tamale Pie	<input type="radio"/>										
Chicken Breast with Gravy	<input type="radio"/>										
Beef Strips	<input type="radio"/>										
Beef Frankfurters	<input type="radio"/>										
Hamburger	<input type="radio"/>										
SIDE DISH	1 2 3 4 5 6 7 8 9										1 2 3 4 5 6 7 8 9
Creamed Ground Beef	<input type="radio"/>										
Pork Sausage Links	<input type="radio"/>										
Ham Slices	<input type="radio"/>										
White Rice	<input type="radio"/>										
Macaroni Twist	<input type="radio"/>										
Oriental Rice	<input type="radio"/>										
Baked Beans with Bacon Sance	<input type="radio"/>										
Red Beans and Rice	<input type="radio"/>										
VEGETABLE	1 2 3 4 5 6 7 8 9										1 2 3 4 5 6 7 8 9
Carrots	<input type="radio"/>										
Corn	<input type="radio"/>										
Green Beans	<input type="radio"/>										
French Style Green Beans	<input type="radio"/>										
CAKE	1 2 3 4 5 6 7 8 9										1 2 3 4 5 6 7 8 9
Coffee Cake with Crumb Topping	<input type="radio"/>										
Spice Cake with Topping	<input type="radio"/>										
Sour Cream Tea Cake	<input type="radio"/>										
Fudge Cake with Topping	<input type="radio"/>										
Yellow Cake with Topping	<input type="radio"/>										
BREAD	1 2 3 4 5 6 7 8 9										1 2 3 4 5 6 7 8 9
Loaf Bread	<input type="radio"/>										
Hamburger Roll	<input type="radio"/>										
White Bread	<input type="radio"/>										
Wheat Bread	<input type="radio"/>										

CONT: 1. Please rate the acceptability of the Tray Ration food items you ate this week.



2. What type of pogey bait did you take to the field with you? Please list all items.
(answers are confidential)

3. Would you like to see any of the Tray Ration food items you ate this week added to the T-Ration menus?
Please list the items below.

4. Of the Tray Ration food items you ate this week which food items would you NOT like included
in the Tray Ration menus?

5. Please rate the portion size of the Tray Ration food items that you ate this week.

Much Too Little	Moderately Too Little	Somewhat Too Little	Just Right	Somewhat Too Much	Moderately Too Much	Much Too Much
1	2	3	4	5	6	7

ENTREES

Scrambled Eggs with Bacon & Cheese (FD)

Did Not Eat	1	2	3	4	5	6	7
----------------	---	---	---	---	---	---	---

Plain Scrambled Eggs

Western Scrambled Eggs

Corned Beef Hash

Roast Beef Hash

Chicken Chow Mein

Beef Chunks with Noodles

Tamale Pie

Chicken Breast with Gravy

Beef Strips

Beef Frankfurters

Hamburger

1	2	3	4	5	6	7
---	---	---	---	---	---	---

SIDE DISH

Creamed Ground Beef

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Pork Sausage Links

Ham Slices

White Rice

Macaroni Twist

Oriental Rice

Baked Beans with Bacon Sauce

Red Beans and Rice

1	2	3	4	5	6	7
---	---	---	---	---	---	---

VEGETABLE

Carrots

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Corn

Green Beans

French Style Green Beans

CAKE

Coffee Cake with Crumb Topping

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Spice Cake with Topping

Sour Cream Tea Cake

Fudge Cake with Topping

Yellow Cake with Topping

BREAD

Loaf Bread

1	2	3	4	5	6	7
---	---	---	---	---	---	---

Hamburger Roll

White Bread

Wheat Bread

SPREAD

Cheese Spread

1	2	3	4	5	6	7
---	---	---	---	---	---	---

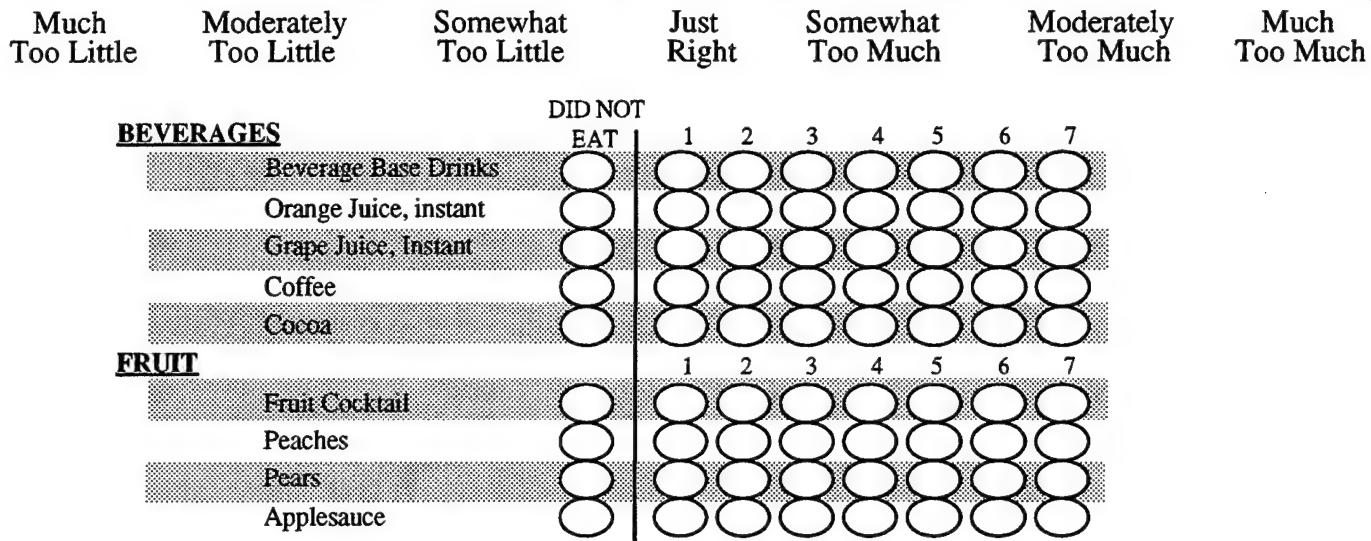
Peanut Butter

Jelly

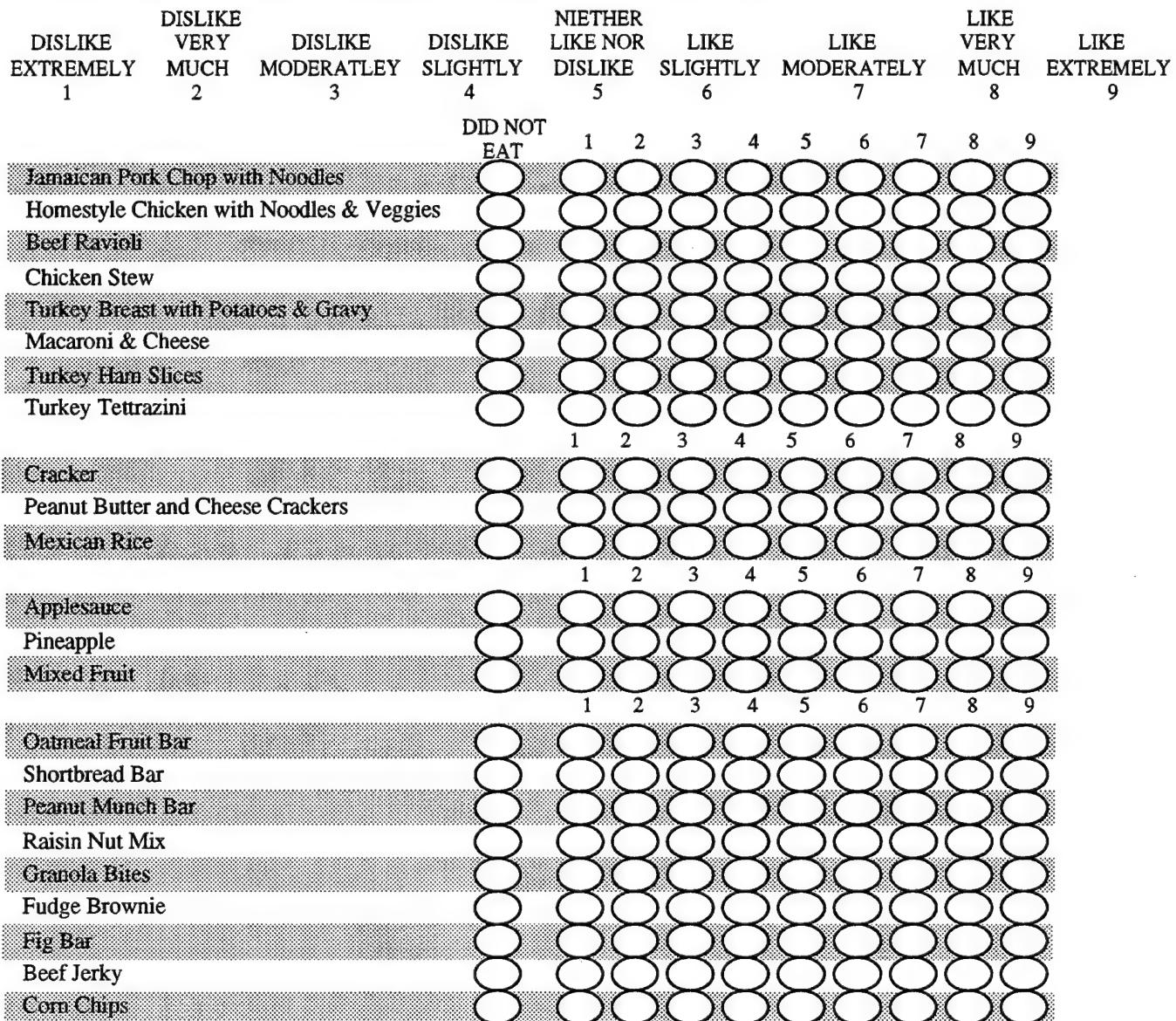
Ranchero Sauce

Jalapeno Cheese Spread

CONT: 5. Please rate the portion size of the Tray Ration food items that you ate this week.



6. Please rate the acceptability of the MRE food items you ate this week.



CONT: 6. Please rate the acceptability of the MRE food items you ate this week.

DISLIKE EXTREMELY 1	DISLIKE VERY MUCH 2	DISLIKE MODERATELY 3	DISLIKE SLIGHTLY 4	NIETHER LIKE NOR DISLIKE 5	LIKE SLIGHTLY 6	LIKE MODERATELY 7	LIKE VERY MUCH 8	LIKE EXTREMELY 9
Did Not Eat								
				1	2	3	4	5
Lemon Pound Cake								
Orange Pound Cake								
Jelly Rancher Candy								
Skittles Candy								
Salsa, wet pack								
Salsa, freeze dried								
Tabasco Sauce								
Combo Pack, PB & J								
Jalapeno Cheese Spread								
Beverage Base Drinks								
Sugar Free Beverage								
Lemon Tea								
Coffee								
Cocoa								

7. Would you like to see any of the MRE food items you ate this week added to the MRE? Please list the items below.

8. Of the MRE food items you ate this week which food items would you NOT like included in the MRE ration? Please list the items below.

9. Please rate the portion size of the MRE food items that you ate this week.

Much Too Little	Moderately Too Little	Somewhat Too Little	Just Right	Somewhat Too Much	Moderately Too Much	Much Too Much
1	2	3	4 Did Not Eat	5	6	7
Jamaican Pork Chop with Noodles						
Homestyle Chicken with Noodles & Veggies						
Beef Ravioli						
Chicken Stew						
Turkey Breast with Potatoes & Gravy						
Macaroni & Cheese						
Turkey Ham Slices						
Turkey Tetrazini						
Cracker						
Peanut Butter and Cheese Crackers						
Mexican Rice						
Applesauce						
Pineapple						
Mixed Fruit						
Oatmeal Fruit Bar						
Shortbread Bar						
Peanut Munch Bar						
Raisin Nut Mix						
Granola Bites						
Fudge Brownie						
Fig Bar						
Beef Jerky						
Corn Chips						
Lemon Pound Cake						
Orange Pound Cake						
Jolly Rancher Candy						
Skittles Candy						
Salsa, wet pack						
Salsa, freeze dried						
Tabasco Sauce						
Combo Pack, PB & J						
Jalepeno Cheese Spread						
Beverage Base Drinks						
Sugar Free Beverage						
Lemon Tea						
Coffee						
Cocoa						

10. Do you have any other comments on the MRE that you ate this week?

11. Do you have any other comments on the Tray Ration that you ate this week?

**APPENDIX B
MENUS**

**Meal, Ready to Eat
Menus for the 1994 Field Evaluation**

Menu 1

Jamaican Pork Chop W/Noodles
Applesauce
MRE Cracker
Peanut Butter & Jelly Combo Pack
Oatmeal Fruit Bar
Raisin Nut Mix
Jolly Rancher
Beverage Base

Menu 3

Beef Ravioli
Pineapple
MRE Cracker
Peanut Butter & Jelly Combo Pack
Skittles
Beef Jerky
Cocoa Beverage Powder

Menu 5

Turkey Breast w/Potatoes & Gravy
MRE Cracker
Jalapeno Cheese Spread
Corn Chips
Salsa (FD)
Orange Pound Cake
Lemon Tea

Menu 7

Turkey Ham Slices
Mexican Rice
MRE Cracker
Peanut Butter & Jelly Combo Pack
Fig Bar
Fudge Brownie
Lemon Tea

Menu 2

Homestyle Chicken w/Noodles &
Vegetables
MRE Cracker
Peanut Butter & Jelly Combo Pack
Peanut Butter Munch Bar
Beef Jerky
Cocoa Beverage
Sugar Free Beverage Base

Menu 4

Chicken Stew
Pineapple
MRE Cracker
Peanut Butter & Jelly Combo Pack
Shortbread Bar
Lemon Pound Cake
Beverage Base

Menu 6

Macaroni & Cheese
MRE Cracker
Peanut Butter & Jelly Combo Pack
Corn Chips
Salsa
Fudge Brownie
Beverage Base

Coffee, Sugar, Creamer, and Tabasco Sauce were included in every menu.

Heat And Serve Menu

BREAKFAST

DAY 1

NO BREAKFAST MEAL

Beef Strips
White Rice
Carrots
Sour Cream Cake
Break/Milk
Coffee
Peanut Butter/Jelly
Orange/Apple (Fresh Fruit)
Salad

DAY 2

Scrambled Eggs w/Ranchero Sauce (FD)
Pork Sausage Links
Spice Cake w/Crumb Topping
Peaches
Orange Juice
Bread/Milk
Coffee/Cocoa
Apple/Orange (Fresh Fruit)

Beef Chunks w/Noodles
Carrots
Applesauce
Lemon/Cherry/Orange Drink
Break/Milk
Coffee
Peanut Butter/Jelly
Orange/Apple (Fresh Fruit)
Salad

DAY 3

Scrambled Eggs, Western
Ham Slices
Fruit Cocktail
Oatmeal, plain
Coffee/cocoa
Bread/Milk
Orange Juice
Apple/Orange (Fresh Fruit)

Tamale Pie
White Rice
Corn
Applesauce
Break/Milk
Coffee
Peanut Butter/Jelly
Orange/Apple (Fresh Fruit)
Salad
Grape Drink

DAY 4

Roast Beef Hash
Pork Sausage Links
Pears
Bread/Milk
Orange Juice
Coffee Cake w/Crumb Topping
Oatmeal, Apple Cinnamon
Apple/Orange (Fresh Fruit)

Chicken Breast w/Gravy
Macaroni Twist
French Style Green Beans
Yellow Cake w/Crumb Topping
Break/Milk
Coffee
Peanut Butter/Jelly/Ketchup
Orange/Apple (Fresh Fruit)
Salad
Orange/Cherry Drink

DAY 5

Scrambled Eggs w/Cheese (FD)
Creamed Ground Beef
Oatmeal, Strawberry
Sour Cream Tea Cake
Assorted Cereal
Bread/Milk
Grape Juice
Coffee/Cocoa
Apple/Orange (Fresh Fruit)

Meatballs
Red Beans & Rice
Green Beans
Sour Cream Tea Cake
Cherry Beverage Powder
Break/Milk
Coffee
Peanut Butter/Jelly
Orange/Apple (Fresh Fruit)
Salad

DAY 6

Scrambled Eggs, Plain w/Ranchero Sauce
Ham Slices
Fruit Cocktail
Oatmeal, Brown Sugar and Cinnamon
Bread/Milk
Apple/Orange (Fresh Fruit)

Beef Frankfurters
Loaf Bread
Baked Beans w/Bacon Sauce
Cheese Spread
Break/Milk
Coffee
Peanut Butter/Jelly
Orange/Apple (Fresh Fruit)
Salad

DAY 7

Scrambled Eggs w/Bacon (FD)
Pork Sausage Links
Oatmeal, Apple Cinnamon
Spice Cake w/Crumb Topping
Grape Juice
Bread/Milk
Coffee/Cocoa
Apple/Orange (Fresh Fruit)

APPENDIX C
PORTION SIZES

MRE MEAN PORTION SIZE RATINGS

Mean	Std Dev	N	Label
3.77	1.07	96	JAMAICAN PORK CHOPS WITH NOODL
3.71	.90	87	HOMESTYLE CHICKEN WITH NOODLES
3.65	.85	89	BEEF RAVIOLI
3.72	.91	90	CHICKEN STEW
3.67	.94	98	TURKEY BREAST WITH POTATOES &
3.87	1.25	83	MACARONI & CHEESE
3.57	.85	89	TURKEY HAM SLICES
3.63	.87	83	TURKEY TETTRAZINI
3.65	.84	107	CRACKER
3.65	.89	82	PEANUT BUTTER AND CHEESE CRACK
3.93	1.33	81	MEXICAN RICE
3.40	1.01	90	APPLESAUCE
3.42	1.04	83	PINEAPPLES
3.49	1.02	65	MIXED FRUIT
3.60	.88	43	OATMEAL COOKIE BAR
4.25	1.37	88	SHORTBREAD BAR
3.61	.89	83	PEANUT MUNCH BAR
3.73	1.13	91	RAISIN NUT MIX
3.51	.98	88	GRANOLA BITES
3.89	1.12	100	FUDGE BROWNIES
3.51	1.23	81	FIG BAR
3.36	1.15	111	BEEF JERKY
3.36	1.24	113	CORN CHIPS
3.48	.93	89	LEMON POUND CAKE
3.50	.99	76	ORANGE POUND CAKE
3.63	1.14	94	JOLLY RANCHER CANDY
3.58	1.11	83	SKITTLES CANDY
3.72	1.09	81	SALSA, WET PACK
4.17	1.31	54	SALSA, FREEZE DRIED
3.62	1.13	80	TABASCO SAUCE
3.68	.85	84	COMBO PACK, PB & J
3.41	1.13	92	JALEPENO CHEESE SPREAD
3.48	.96	84	BEVERAGE BASE DRINKS
3.52	1.11	69	SUGAR FREE BEVERAGE
3.23	1.08	74	LEMON TEA
3.68	1.01	56	COFFEE
3.52	.98	64	COCOA

TRAY RATION MEAN PORTION SIZE RATINGS

Mean	Std Dev	N	Label
4.27	1.48	102	SCRAMBLED EGGS W/BACON
4.30	1.47	101	PLAIN SCRAMBLED EGGS
4.19	1.45	89	WESTERN SCRAMBLED EGGS
3.67	.90	87	ROAST BEEF HASH
3.61	.82	95	BEEF CHUNCKS W/NOODLES
3.73	1.14	93	TAMALE PIE
3.70	1.18	100	CHICKEN BREAST W/GRAVY
3.69	.93	78	BEEF STRIPS
3.57	1.03	113	BEEF FRANKFURTHERS
3.70	.98	84	CREAMED GROUND BEEF
3.74	.87	120	PORK SAUSAGE LINKS
3.61	.88	114	HAM SLICES
3.71	.89	101	WHITE RICE
3.95	1.10	88	MACARONI TWIST
3.68	1.05	102	BAKED BEANS W/BACON SAUCE
3.78	1.17	88	RED BEANS & RICE
3.66	.99	98	CARROTS
3.53	.94	114	CORN
3.65	1.11	104	GREEN BEANS
3.70	1.12	86	FRENCH STYLE GREEN BEANS
3.81	.82	103	COFFE CAKE W/CRUMB TOPPING
3.82	.78	98	SPICE CAKE W/TOPPING
3.79	.82	91	SOUR CREAM TEA CAKE
3.74	.92	92	YELLOW CAKE W/TOPPING
3.80	.95	80	LOAF BREAD
3.85	.81	117	WHITE BREAD
3.75	.87	88	WHEAT BREAD
3.75	.85	64	CHEESE SPREAD
3.97	.62	69	PEANUT BUTTER
3.93	.69	70	JELLY
3.81	.89	68	RANCHERO SAUCE
3.48	1.01	79	JALEPENO CHEESE SPREAD
3.75	.73	99	BEV BASE DRINKS
3.83	.89	117	ORANGE JUICE
3.76	.88	85	GRAPE JUICE
3.83	.67	66	COFFEE
3.86	1.02	84	COCOA
3.55	1.04	110	FRUIT COCKTAIL
3.49	1.05	98	PEACHES
3.54	1.04	106	PEARS
3.44	1.05	88	APPLESAUCE

**APPENDIX D
SUGGESTED FOOD ITEMS**

SUGGESTED FOOD ITEMS TO INCLUDE IN THE MRE

Participants recommended several food items for inclusion into the MRE. Below are the foods listed by food group that were mentioned by more than one participant. This information was collected before the start of the field evaluation, to prevent any influence of opinions by the new food items.

ENTREE: Pizza, Fish, Steak, Lasagna, Rice, Burritos, Seafood, Chili, Cheeseburgers, Chicken, Hamburger, Chicken Nuggets, Enchiladas, Italian Foods, Ham & Cheese Omelet, Ravioli, Macaroni & Cheese, and Meatballs.

CRACKERS: Wheat Thins, Saltines, Graham, Wheat, Club, Cheese, Peanut Butter Ritz, Townhouse, Salt Free, Salted, Animals, Brand Name, Butter and Cheese Its.

SPREADS: Cream Cheese, Cheese, Mayonnaise, Tuna, Ranch, Butter, Cheddar, Ketchup, Jelly, Spicy Cheese, Turkey, Ham, and Peanut Butter.

SEASONINGS: Pepper, Mrs. Dash, Season Salt, Garlic Salt, Mustard, Chili Powder, Garlic Powder, Spicy, and Oregano.

SNACKS: Chips, Peanuts, Pretzel, Beef Jerky, Trail Mix, Popcorn, Sunflower Seeds, Cookies, Fruit, Carrot Sticks, Doritos, Fruit Cocktail, Granola, Nutty Bars, Candy Bars, Ritz Bits, and Apple Slices.

BEVERAGES: Gatorade, Tea, Fruit Juices, Soda, Orange Juice, Kool Aid, Lemonade, Coke, and Iced Tea.

CANDY: Snickers, M&Ms, Bubble Gum, Brand Names, Hard Candy, Jolly Ranchers, Twix, Chocolate, Granola Bars, and Skittles.

OTHER ITEMS: Soup and Fruit

SUGGESTED FOOD ITEMS TO INCLUDE IN THE MRE BY MEAL

BREAKFAST: Bacon, Bagels, Biscuit, Cereal, Eggs, French Toast, Hash Browns, Muffins, Oatmeal, Pancakes, Sausage, and Waffles.

LUNCH: Beef Sandwich, Ham Sandwich, Cheeseburger, Lunch Meats, Macaroni & Cheese, Peanut Butter and Jelly, and Pizza.

DINNER: Beef Strips, Lasagna, Chicken, Steak, Vegetable/Vegetarian.

SUGGESTED FOOD ITEMS TO INCLUDE IN THE HEAT AND SERVE RATION

Participants recommended several food items for inclusion the Heat and Serve Ration. Below are the foods listed by food group that were mentioned by more than one participant. This information was collected before the start of the field evaluation, to prevent any influence of opinions by the new food items.

ENTREE: Fish, Pizza, Burritos, Steak, Tacos, Lasagna, Enchilada, Turkey, Hamburgers, Mexican, Ham, Beef Tips and Noodles, Rice, Chicken, and Meats.

VEGETABLES: Corn, Broccoli, Broccoli & Cheese, Peas, Beans, Greens, Tomatoes, Green Beans, Spinach, Potatoes, and Lima Beans.

CRACKERS: Cheese, Saltines, Club and Wheat.

BEVERAGES: Soda, Lemonade, Kool Aid, and more flavors.

SUGGESTED FOOD ITEMS TO INCLUDE IN THE HEAT AND SERVE RATION BY MEAL

BREAKFAST: Pancakes, French Toast, Waffles, Omelets, Cereal, Eggs, Muffin Sandwiches, Steak & Eggs, Muffins, Ham & Egg Omelet, Fresh Milk, and Coffee Cake

LUNCH: Hamburgers, Steak, Burritos, Hot Dogs, Lunch Meats, Sandwiches, Pizza, Turkey, Elk Steak, and ethnic foods.

DINNER: Steak, Fish, Lasagna, Tacos, Venison, Pizza, Salad, Seafood, Potatoes, and Pasta.

**APPENDIX E
OVERALL COMMENTS**

MRE OVERALL COMMENTS

- GOOD CHOICE OF CANDY
- MOST WERE GOOD
- SOME OF THE COMBINATIONS DO NOT MAKE A BALANCED/ACCEPTABLE MEAL.
- APPLESAUCE TASTED STALE.
- FUDGE MADE YOU DEHYDRATED.
- JAMAICAN PORK CHOP TASTED NOTHING LIKE JAMACIAN SPICE.
- EGGS WERE LIKE BAD GLUE (IT STUCK/SUCKED). THE ORANGE JUICE TASTED SPOILED.
- SHOULD MAKE SALSA AND CHIP ITS OWN MRE AND MAKE PORTION BIGGER
GET RID OF MACARONI & CHEESE
- THE MRE'S I ATE THIS WEEK ARE MUCH BETTER THAT THE OLD ONES
- I THOUGHT THE HEATER INSIDE WAS A GREAT IDEA. MAIN ENTREES IN ALL
OF THE MRE'S WERE PRETTY GOOD. I LIKE THESE MUCH BETTER THAN THE
OLD ONES.
- PUT THE TEAR SLOTS BACK ON THE PACKAGES FOR EASY OPENING
- I FELT THAT THE MRE'S WERE VERY GOOD. MOST OF THE ITEMS WERE TASTY.
THE MRE HEATER IS A BIG PLUS AND SHOULD BE IN EVERY MRE. I HOPE THE
MEALS I ATE GET FIELDDED.
- IT IS A GREAT IDEA TO HAVE THE HEATING PACKET IN EACH MRE.
- I'VE NEVER ACTUALLY ATE AN ENTREE OR FULL MRE.
- ALL MRE'S ARE A REALLY BIG IMPROVEMENT.
- MRE'S ARE BETTER.
- YOU ARE GETTING WARMER BUT, NEED TO TEST THIS FOOD ON YOURSELF.
I WOULD LIKE TO SEE TOOTH PICKS ADDED TO IT. MRE'S ARE GOOD READILY
AVAILABLE WHEN NEEDED.
- GOOD
- I'M GLAD WE HAD CHANCE TO TEST WHAT OUR FUTURE FIELD MEALS WILL
ENTAIL.
- ALL GOOD
- ADD THEM ALL
- ALL ARE VERY GOOD, AND WOULD LIKE TO SEE THEM ALL ADDED INTO THE
SYSTEM
- I HATE MRE'S
- ADD BLACK PEPPER TO THE ACCESSORY PACKS.
- ADD VITAMIN PILLS
- I WOULD LIKE TO STILL SE THE OATMEAL COOKIE STILL IN THE SYSTEM
- ALL WERE GOOD TASTING BETTER THAN THE OLD ONES
- BETTER THAN THE OLD ONES
- THE CAKES, JERKY AND OTHER NEW ENTREES ARE GREAT.
- SURE ARE ALOT BETTER
- I THINK THE TEST MRE'S ARE A GREAT IMPROVEMENT AND SHOULD REPLACE
THE ORIGINAL ONES.
- NOT HEALTHY ENOUGH
- IMPROVED FOOD, IT WAS GREAT, I HOPE TO SEE THESE MEALS SOON
- MRE'S HAVE DEFINITELY IMPROVED 110%
- THEY WERE DEFINITELY A PLEASANT CHANGE TO THE SAME OLD MRE'S I
USUALLY END UP GETTING.

- THEY WERE ALL ALOT OF BETTER THAN THE OLD ONES.
- HAVE IMPROVED 100%
- THEY ARE DIFFERENT FROM THEY WERE BEFORE
- THE NEW MENU WAS AN ENJOYABLE CHANGE, BUT THE PAPERWORK WAS HASSEL
- BETTER THAN OLD MRE'S - MORE FOOD
- SOME OF THEM DID NOT TASTE GOOD
- THESE MRE'S ARE MORE EDIBLE THAN THE OTHERS
- THEY WERE A GREAT IMPROVEMENT FORM THE OLD ONES. I DON'T MIND EATING THESE BUT I REGRET EATING THE OLD ONES.
- THE MRE'S HAVE IMPROVED 100% COMPARED TO THE OLDER ONES.
- THE NEW MRE IMPROVED 100% THAN THE OLD ONES.
- PLEASE INCLUDE DENTAL FLOSS. THE INNER PACKETS ARE TOO HARD TO OPEN IN FIELD ENVIRONMENT. INNER PACKETS SHOULD BE RESEALABLE.
- THE CHICKEN STEW WAS GREAT.
- I LIKE THESE MRE'S BETTER THAN THE ONES BEFORE.
- GOOD
- THEY WERE DELICIOUS
- SOME OF THE BEVERAGE MIXES WERE TORN OPEN IN THE PACKAGE. THE JAMAICAN PORK NEEDS NOODLES. IT SEEMS ALL OF THE MEALS HAVE PEANUT BUTTER AND JELLY - YOU NEED MORE DIVERSITY ON THE CRACKER SPREADS. THE CRACKERS ARE USUALLY BROKEN.
- THEY ARE BETTER, BUT STILL TOO MUCH FOOD.
- IN THE MRE'S I ATE THERE WAS NO FRUIT. I WOULD REALLY LIKE IT IF THERE WAS FRUIT IN EVERY MRE PACK. THE FUDGE BROWNIE WAS A LITTLE RICH. THE POUND CAKE WAS A LITTLE THICK BUT THERE WERE NICE TO HAVE.
- THEY WERE BETTER THAN THE OLD MRE'S.
- ADD FISH
- ADD FISH - TAKEOUT PORK
- TOO MUCH SWEETS
- A NUMBER OF SOLDIERS COMPLAINED OF STOMACH CRAMPS
- THEY WERE GOOD OVERALL - THE CHIPS NEED TO BE BIGGER FOR THE SALSA
- THEY GAVE ME DIARREHA
- EXCELLENT CHANGES
- THE NEW MRE'S ARE A TRIBUTE TOWARD FOOD EXCELLENCE. REALLY ENJOYED THE MRE. THEY ARE MORE FILLING THAN THE OLD ONES
- THE JELLY RAN THROUGH MY CRACKER AND GOT MY HAND ALL STICKY.
- MOST OF THE CHANGES ARE FOR THE BEST
- THEY WERE OK
- FOR THE MOST PART THE MEALS ARE OK. THE RICE IS NOT A WINNER THAT'S FOR SURE.
- LESS CALORIES

TRAY RATION - OVERALL COMMENTS

- EGGS STILL NEED WORK
- GET RID OF THE EGGS
- HALF WERE GOOD
- EGGS KILL YOUR APPETITE AND BREAD GETS HARD AS SOON AS YOU OPEN IT
- EGGS ARE BAD
- THEY STINK
- GET RID OF MACARONI TWIST
- THE EGGS HAVE BECOME MORE POWDERY
- NEED TO CHANGE THE EGGS
- TRAY RATION SHOULD BE SERVED HOT. MOST OF THE MEALS WHERE SOMEWHAT OLD.
- MOST OF THE TIME EGGS WERE TOO DRY AND HARD
- PLEASE TAKE EGGS OFF THE MENU
- DO NOT PUT THE EGGS IN THE TRAY RATION - EVERYTHING ELSE WAS PRETTY GOOD
- LOSE ALL THE EGGS. COOK THE CHICKENS BETTER. MACARONI TWIST SHOULD BE A DANCE, NOT SOMETHING WE EAT.
- THE FOOD WAS GOOD BUT THE EGGS HAVE TO GO
- EGGS GOT TO GO, THEY WERE QUITE ROTTEN, DRY & NASTY. EVERYTHING ELSE WAS EDIBLE.
- SOME ENTREES DON'T HOLD HEAT WELL. EGGS ARE ON THE BLAND SIDE.
- SCRAMBLED EGGS NEED TO BE PERFECTED TO TASTE MORE REAL RATHER THAN SYNTHETIC. THE RATIONS DO NOT HAVE AN AROMA. NO GOOD FOOD SMELLS TO ENHANCE APPETITE. THEY FILL THAT GROWLING HOLE IN YOUR STOMACH W/LITTLE OR NO FLAVOR. THEY FILL THE VOID MADE BY ENERGY.
- NOT ENOUGH JALAPENO CHEESE
- THE RATION REALLY IMPROVED, TOO.
- IMPROVE ON HOW THE EGGS ARE COOKED. OR SCRATCH IT; JUST PLAIN EGGS ARE GOOD.
- NEED TOOTH PICKS
- ALL SEEMED THE SAME AS THE OLD ONE.
- SCRAP THE EGGS!!
- ALL WERE EXCELLENT. HOWEVER, GET RID OF THE EGGS.
- THE EGGS WERE COLD AND HARD
- ALOT OF WORK TO DO, I WOULD START OVER AGAIN. SERVE SOLDIERS FOOD THAT IS ACCEPTABLE TO YOU AND SOMEBODY DID NOT PUT THESE MEAL THRU TASTE TESTS, IF THEY HAVE AND THE MODELS HAVE COME THIS FAR IN TESTING FIRE THE MAKERS AND TESTERS OF THE FOOD.
- I HOPE THE ARMY COMES UP WITH A PLAN TO FEED SOLDIERS FRESHER/REAL FOOD.
- THE COCOA HAS A BAD AFTER TASTE
- DO NOT LIKE THE EGGS
- THE EGGS TASTED LIKE FLOUR
- EGGS WERE VERY BAD, THE REST WAS OK.
- HATE TRAY RATIONS LESS
- YUMMY
- THE EGGS STILL SUCK!
- EGGS WERE A DE-EVOLUTION
- TRAY RATION JUST ARE

- NOT THAT GOOD NOT HEALTHY ENOUGH
- EGGS NEED IMPROVEMENT
- THEY ARE BETTER, BUT IF WE COULD HAVE EGGS MADE TO ORDER THEY WOULD BE GREAT
- THEY WERE PRETTY MUCH OK.
- THE EGGS!
- I REALLY HAVE NOTHING TO COMPARE IT TO, FOR I HAVE NOT HAD T-RATIONS BEFORE
- EGGS SUCKED - PORK SAUSAGE IS GOOD - BEVERAGE WON'T SEEP THROUGH THE CUP, BUT WILL SEEP THROUGH THE PLATE - PLATE SURVEY?
- EGGS WERE NO GOOD
- DID NOT LIKE
- T-RATS ARE STILL NASTY, PRETTY MUCH AS FOR BREAKFAST. DINNER ISN'T THAT BAD BUT YOU NEED TO WORK ON BREAKFAST.
GET RID OF THE EGGS!!!!
- EGGS!!!
- THE EGGS NEED ALOT OF WORK OTHER THAN THAT I ENJOYED THE MEALS PRETTY MUCH.
- GOOD
- DELICIOUS
- THE EGGS WERE AWFUL AS WERE THE RED BEANS AND RICE.
- I SEE MUCH IMPROVEMENT IN THE T-RATIONS.
- ALL THE MEATS TASTE THE SAME
- YOU HAVE A BETTER VARIETY GET RID OF EGGS AND PORK
- ADD FISH - TAKEOUT PORK
- EGGS ARE NO GOOD - NO PORK
- STOMACH CRAMPS
- NASTY
- THEY GAVE ME DIARREHA
- DROP THE EGGS AND TRY PANCAKES OR WAFFLES
- THE EGG ENTREES NEED MORE IMPROVEMENT
- IMPROVING
- DISGUSTING
- THE JALAPENO CHEESE SPREAD WAS REALLY GOOD. I WOULD LIKE TO SEE IT REPLACE
THE JELLY IN THE MRE.
- IT ISN'T LIKE MOM USED TO MAKE
- GET RID OF THE EGGS THE EGG WERE THE WORST, TOO HOT FOR SOUR CREAM

APPENDIX F
MEAN ACCEPTABILITY RATINGS OF FREEZE DRIED EGGS

Mean acceptability Rating of Freeze Dried Eggs by Past Field Evaluation

Place of Evaluation Type of Evaluation	FT CAMPBELL (T-RATION)	ARIEM (UGR*)	FT. CAMPBELL (UGR*)
Western Scrambled Eggs	5.69	4.43	5.73
Scrambled Eggs w/Cheese	5.70	3.89	4.72
Plain Scrambled Eggs	5.58	5.14	-----

* UGR, Unitized Group Ration

APPENDIX G
FOCUS GROUP REPORT

PURPOSE: To investigate new developmental and non-developmental food items. Both new Tray Rations and MRE items were evaluated. All rations were provided by Natick RD&E Center.

A briefing was held on 14 Sep 94 for all test participants of the 542nd Maintenance Battalion. Test procedures were discussed and background information was collected.

A field evaluation was conducted on the Individual Soldier Enhanced Ration (ISER), Tray Rations and Biodegradable cups. The ration and cup field test was held at the Yakima Training Center in Yakima, WA on 15-21 Sep 94. Approximately 170 soldiers participated in the evaluation. Data were collected daily immediately following the morning and evening tray rations meals. On 21 Sep 94 a final questionnaire was administered to all field test participants and a focus group was held once all data collection was complete.

The focus group consisted of approximately 15 soldiers that participated in the field evaluation. The soldiers that were interviewed were also familiar with the current and the new items in the MREs and Tray Rations. Their recommendations and suggestions for improving the new menus (ISER), MREs and Tray Rations are as follows:

NEW MREs

ENTREES: Overall, most of the new MRE food items were acceptable to the soldiers but they still requested more variety among entrees. The soldiers liked the Jamaican Pork Chop but suggested to increase the portion size. The Turkey Ham Slices, Chicken Stew and the Ravioli were also well accepted. During the focus group soldiers were asked which foods they would like to see in the MRE, their responses are included in Table G-1.

TABLE G-1
ITEMS PREFERRED FOR MRE ENTREES

PIZZA	HAMBURGERS	LASAGNA	PORK CHOW MEIN
CHINESE FOOD	FISH FILLET	BBQ CHICKEN	SEAFOOD
VEGETARIAN MRE	DIET MRE	TURKEY MRE	PASTA DISHES

SNACKS: Soldiers liked most of the snack items included in the MRE. Some suggestions for improvement to these snacks are to include a beef jerky with different flavors available such as terriaki, peppered, regular and smoked. Also, soldiers would like a larger portion size of the corn chips and the corn chips in the same MRE as the salsa.

The soldiers also noted that they tend to save their snacks for later on in the day, so packaging and easy-to-eat foods were important issues for snack type items. Table G-2 represents other items that soldiers would like to see in the new MREs.

TABLE G-2
ITEMS PREFERRED FOR MRE SNACKS

ENERGY BARS	TRAIL MIX	GRANOLA BARS	TWINKIES
SUNFLOWER SEEDS		OATMEAL BARS	

FRUIT: Soldiers would like to see several varieties of both wet pack fruits and dried fruits included in the MRE. The soldiers reported that dried fruit items while on hikes and wet pack fruit during less activity would be best. Suggestions for dried fruit include banana and apple chips.

CRACKERS/SPREADS: Some soldiers complained about the MRE crackers because they crumble and fall apart easily. Soldiers would like more variety for crackers and spreads. The Jalapeno Cheese was highly accepted but portion size was again a complaint. The Peanut butter and Jelly Combo Pack was also acceptable. Typically, soldiers use the Peanut butter and Jelly together and welcomed the combo pack.

ITEMS PREFERRED FOR CRACKERS/SPREADS: Ritz like crackers, Wheat Thins, Wheat Crackers, and Saltines. Would like to see more variety of cheese spreads (e.g. cheddar).

SWEETS: Both candies, Jolly Ranchers and Skittles, were well accepted by the soldiers. Some soldiers expressed that they would like to see less candy in the MRE and more snack items containing less sugar. Table G-3 represents candy/sweet items soldiers would like to see in the new MREs.

TABLE G-3
ITEMS PREFERRED FOR MRE CANDY/SWEETS

LEMON DROPS	RED HOTS	FIRE BALLS	GUM
SUGAR FREE GUM			

CONDIMENTS: Though soldiers are very pleased with Tabasco Sauce in the MRE they would like other condiments available to them when eating the ration. Table G-4 represents their suggestions for condiments in the MRE.

TABLE G-4
ITEMS PREFERRED FOR MRE CONDIMENTS

GARLIC SALT	ONION SALT	SEASON SALT	SOY SAUCE
A-1/STEAK SAUCE			

Overall the new MREs were acceptable. Soldiers requested more variety; approximately twenty menus. Several soldiers noted that after eating MRE's for several days they will no longer eat the main entree because of menu fatigue. They typically break down the ration and eat crackers and cheese, etc. Soldiers would like more variety in their meals which may increase consumption and acceptability.

COMMENTS ON THE MRE HEATERS: Soldiers liked having the Flameless Ration Heater (FRH) included in the MRE. There were some not used according to the stated directions. When asked if hot water or hot entree was more important to them, the majority of the focus group participants responded that hot water was more important and would like a water heating device included in the MRE. Though, the MRE heaters are utilized by most soldiers, some soldiers actually prefer the MREs cold or do not have time to heat the MRE. Time seemed to be biggest issue and the main reason why soldiers do not heat the MREs but they did note that they like having the option. Table G-5 represents suggestions that soldiers would like to see in the FRH.

TABLE G-5

FRH SUGGESTIONS

INCLUDE A HEATER THAT CAN HEAT TWO ITEMS
CREATE A REUSABLE HEATER
INCLUDE TWO HEATERS IN THE MRE
INCLUDE A DEVICE, SUCH A KNIFE, IN THE MRE TO OPEN THE FRH

COMMENTS ON THE MRE PACKAGING: MREs generate a lot of waste - 1 case (12 MREs) fills 1 large garbage bag. Although, these particular troops were stationary and had access to waste removal they still felt that the trash was much too bulky.

They suggested making the MRE easier to open. They would like to see perforations on the outer bag and individual pouches and a resealable bag for individual pouches, either zip-loc or wire closures. Soldiers sometimes do not have time to complete the whole entree and would like to save but because of the "messiness" of the food and inability to reseal the pouch they are forced to throw out most left overs. Resealable packages would be ideal especially for soldiers who are on-the-move.

Nutritional labeling was also recommended. Soldiers expressed an interest in knowing the nutritional content of the MREs. Some soldiers are concerned about calories and fat content. Also some may be allergic to certain items in the MREs.

Suggestions were made to make the MRE more like a TV dinner but this group did not carry their MREs and noted that a tray may be more inconvenient to carry for those companies who are required to carry rations.

TRAY RATION FOOD ITEMS

BREAKFAST FOODS: The soldiers had several complaints about the eggs. Although, the Ranchero Sauce made the eggs taste better they still did not like the eggs. They noticed a big change in the oatmeal and it was highly acceptable. They liked the sausage but thought it could have been improved by better preparation (i.e., cooked thoroughly, less watery and greasy) but overall was better than the ham. Table G-6 represents breakfast foods the soldiers would like to see in the Tray Rations.

TABLE G-6

ITEMS PREFERRED FOR TRAY RATION BREAKFAST

WAFFLES	PANCAKES	POP TARTS	FRENCH TOAST
CREAMED BEEF	OATMEAL	GRITS	STEAK AND EGGS
HASH BROWNS	FRIED POTATOES		

DINNER FOODS: The soldiers liked the Meatballs w/Rice, Chicken Breast (although a little dry), Oriental Rice, Tamale Pie and the Green Beans. They did not like the Macaroni Twist but would like more pasta type items. Overall, most of the new Tray Ration dinner food items were acceptable and enjoyed by the soldiers. Table G-7 represents dinner foods the soldiers would like to see in the Tray Rations.

TABLE G-7

ITEMS PREFERRED FOR TRAY RATION DINNER

FRENCH FRIES	HAMBURGERS	SPAGHETTI	TUNA HELPER
QUICHE	CHICKEN NUGGETS	TUNA & NOODLES	MASHED POTATOES
CHICKEN PARM.	TORTELLINI W/ALFREDO	SCALLOPED POTATO	STOVE TOP STUFFING

CONDIMENTS FOR THE TRAY RATIONS: Mustard and ketchup are highly acceptable condiments. Hot sauce was on all of the tables in the mess hall tent and soldiers used it frequently for both dinner and breakfast. Some soldiers would like to see A-1 sauce offered with the Tray Rations.

TRAY COMMENTS:

Comments on the tray, were as follows: the serving trays are too flimsy, thin and the tray gets really soggy when hot. In general, they would prefer sturdier trays and cups.

CONCLUSION: In conclusion, these soldiers found most of the new items to be acceptable but still were dissatisfied with the variety and taste of some of the current and new MREs and Tray Ration items. They noted that expanding the variety of items may improve the rations. The more rations they can choose from may increase consumption, performance and acceptability.

RECOMMENDATIONS FROM THE SOLDIERS FOR MREs:

Increase variety by at least 8 more menus.

Increase the choices of snack type items (i.e., different types of crackers/spreads, and cookies).

Add seasoning packets to the ration.

Add more flavors of beverages.

Provide nutritional labeling.

Add disposable knife to open the ration and heater.

Add a device that can heat water.

Add some type of dental hygiene product (i.e., floss, or sugar free gum).

Add more toilet paper and wet naps.

RECOMMENDATIONS FOR THE TRAY RATION:

BREAKFAST:

Increase variety to more commercial type items (i.e., pop tarts, waffles, and french toast).

Improve the eggs.

DINNER:

Increase variety to more commercial type items (i.e., french fries, hamburgers, pizza, spaghetti, and mashed potatoes).

Increase the variety of condiments.

Produce more durable trays and cups.

Continue to improve the rations by eliminating menu fatigue.